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JOURNAL OF THE ASIATIC SOCIETY.

DRAFTS FOR A FAUNA INDICA.

(Comprising the Animals of the Himalaya Mountains, those of the Valley of the Indus, of the Provinces of Assam, Sylhet, Tipperah, Arracan, and of Ceylon, with Occasional Notices of Species from the Neighbouring Countries.*)

By ED. BLYTH, Curator of the Asiatic Society's Museum, &c. &c.

No. 1. The *Columbidæ*, or PIGEONS and DOVES.

Order IV. *GYRATORES*, Pr. Bonap. *GEMITORES*, McGillivray.

This consists but of a single family, that of the Pigeons,—

Fam. *COLUMBIDÆ*,—

Which subdivides into three marked sub-families, viz.—*Treroninæ*, or arboreal fruit pigeons.—*Gourinæ*, or ground pigeons,—and *Columbinæ*, or ordinary pigeons and doves.

* The object of publishing the present series of Monographs of various groups of animals, is to elicit, as much as to impart, information that might be incorporated in a general work now in preparation; and it is, therefore, earnestly requested that observers, interested in the subject, will favour the author with any additional facts or corrections that may occur to them, and that they will also endeavour to settle any questions that are still at issue, and in short, to render the future conspectus of Indian animals as complete as circumstances will permit of. In the class of birds, it may be here remarked, that any information on the nidification and colour of the eggs, of species generally, and of the song-notes of the smaller *Insessores*, will be particularly acceptable.

Sub-fam. *TRERONINAE.*

The members of this group are eminently frugivorous and arboreal, scarcely ever descending to the ground, and some perhaps never, unless to drink,* and in general they are of a green colour, which renders them difficult to discern amid the foliage of trees. They are distinguished from other pigeons (with the sole known exception of *Ectopistes carolinensis*,) by having constantly fourteen tail-feathers, instead of twelve.† In form of bill, they present a gradation from the strongest beak that occurs throughout the order, to a feeble organ, soft and tumid to near its tip, which alone is corneous; but the gape, especially in the latter case, is very capacious. The tarsi are short, stout, and more or less feathered; and the toes (except in one sub-genus) are remarkably broad-soled, and are furnished with strong and sharp claws, commonly much hooked; hence they have great power of clasping, or holding on to the small branches of trees, while straining to pluck the fruit or berries from the terminal sprays; so that, when feeding, these birds may be commonly observed to lean over and downward so far as to be inverted, and then draw themselves back by the unaided muscular strength of the extremities. The flight of all is powerful and rapid. Three strongly marked genera occur, numerous species of which inhabit the warm regions of the Old World, Australia, and Polynesia; but from America they are wholly excluded.

Genus *TRERON*, Vieillot: *Vinago*, Cuvier. (*Hurrial* and *Hurrwa*, H.; *Hurtel*, Beng.; *N'goo*, Arracan). The HURRIALS.

In this genus may be observed the gradation in form of bill, that has been adverted to, in its full extent; but all the strong-billed species are here included. The plumage is blent and glossless, and almost without exception of a lively green, varied with ashy, and with a stripe of bright yellow on the wings margining their coverts; while the males are commonly further adorned with a deep maronne hue‡ on the

* An individual of *Treron bicincta*, has been seen feeding on the ground; but such instances are extremely rare. *Vide*, also, description of *Tr. nipalensis*.

† Perhaps, however, certain of the ground pigeons may also have more than twelve tail-feathers; which remains to be ascertained. In the domestic breed of *fan-tails*, the number is abnormally multiplied to as many as thirty or more. It is very remarkable that of the two species of *Ectopistes*, which are nearly allied to each other, one should have fourteen tail-feathers, while the other—the celebrated passenger pigeon of North America, should possess but the usual number—twelve. This fact was observed and recorded by the Prince of Canino.

‡ This hue, in different shades of vinous, or claret-colour, occurs in a great number of *Columbidae*, and has been remarked to be almost peculiar to the tribe.

mantle, and with orange, or orange and lilach, on the breast. Irides crimson, with a blue ring encircling the pupil.* The voice, a melodious deep-toned whistle, considerably prolonged and varied in different cadences. Nidification, as in most other arboreal doves and pigeons, and two white eggs produced, of a somewhat less elongated shape than in common pigeons. Except in the pairing season, these birds collect in small, or moderately large flocks, on the topmost branches of high jungle trees, where, if one can be described and is shot at, two or three will commonly fall, that had eluded observation from the similarity of their colouring to that of the foliage. They subsist on fruits and berries of all kinds, and during the season, especially on the small figs of the *Ficus indica* and *F. religiosa*; and they have likewise been observed "devouring the blossoms and newly formed fruit of the mangoe and tamarind trees." Their flesh is esteemed for the table, but the skin requires to be removed, this having a strong bitter taste; and hanging them up for a day or two, when the season will permit of it, improves them much for culinary purposes.

It is necessary to distinguish three well marked sub-genera, as follow,—

A. TORIA (since altered to *Romeris*), Hodgson. Distinguished by the great strength and vertical depth of the corneous terminal portion of the beak, which, in the typical species, is continued back to beyond the feathers of the forehead. The eyes are surrounded by a naked space.

TR. NIPALENSIS: *Toria nipalensis*, Hodgson, *As. Res.* XIX, 164. (*Thorya*, quasi *rostrata*, of the Nepalese.) Green, yellowish below and towards the tail; the crown of the head ash-coloured; mantle of the male, deep maronne-red, and a faint tinge of fulvous on the breast; primaries and their larger coverts, black, the latter margined with yellow; middle tail-feathers green, the rest with a blackish medial band, and broad grey tips; lower tail-coverts cinnamon-coloured (more or less deep) in the male; subdued white, marked with green, in the female. Bill, greenish-white, with a large vermillion spot occupying the membrane at the lateral base of the mandibles: legs also vermillion:

* A partial exception to this occurs in *Tr. nipalensis* only, among the Indian species; at least, the only two living specimens of this bird which I have seen, had dark red-brown irides, with a blue inner circle. Mr. Hodgson describes them as—"outer circle of the iris orange-red, inner circle blue."

irides deep red-brown, with a blue inner circle; and orbital skin, bright green. Length, ten inches and three-quarters, by seventeen inches; closed wing, five inches and three-quarters.

This bird inhabits the central and lower hilly regions of Nepal, and more abundantly, those of Assam and Arracan, spreading southward to the Tenasserim provinces and Malay peninsula. It also occurs in the hilly districts of Bengal, but rarely strays into the plains, though specimens are occasionally met with even near Calcutta. Mr. Hodgson states that—"It is not very gregarious; adheres to the forests; feeds chiefly on soft fruits; and prefers the trees to the ground, but without absolute exclusiveness of habit in that respect."

Most closely allied and hitherto confounded with it, is *Tr. aromatica* of Java, and I believe of the more eastern portion of the Malayan Archipelago generally, (the *Col. curvirostris*, and the female—*C. tannensis* of Gmelin).* The latter differs by having a bright yellow beak, greenish at sides towards base, and the nude skin at the sides of its base is apparently blue, fading into a blackish tint in the dry specimen; while in *Tr. nipalensis* the vermillion colour fades to amber; the anterior half of the crown is much more albescens; the fulvous tinge on the breast much stronger; the maronne colour of the back is more extended; the longest tertaries are greenish-dusky, instead of green; and the lower tail-coverts are of a deeper cinnamon-colour. Lastly, the corneous portion of the upper mandible scarcely extends quite so far back as in *Tr. nipalensis*; and a curious and marked distinction consists in the Indian species, having the inner web of its third primary sinuated, as in the Hurrials of the next section; while its closely allied Javanese representative exhibits no decided trace of such a character. In a third species which I refer to this section, the *Tr. Capellei*, Tem.† (common near the Straits of Malacca), the beak is lengthened by the prolongation of its soft and tumid basal portion, becoming, as remarked by Mr. Strickland, "almost vulturine in form;" while the size of the bird is considerably larger,

* Mr. G. R. Gray's figures of the beak, &c., of a species of Hurrial to which he applies the name *aromatica*, in his illustrated work on the genera of birds, refer to a species of the following section of this genus.

† *Treron magnirostris*, Strickland, *An. and Mag. N. H.*, 1844, p. 116, and doubtless *Vin. giganteus* of Raffles, mentioned in the "Catalogue of Zoological specimens" appended to Lady Raffles's 'Life of Sir St. Raffles,' p. 674; though not the bird referred to in the note attached, which is probably a *Carpophaga*.

and, it may be added, that the situation of the interior web of its third primary exists, but not to the same depth as in *Tr. nipalensis*.

B. Typicall TRERON. Hurrials, with the beak moderately robust, much less so than in the preceding section, its corneous portion occupying the terminal half, or thereabouts. There is no bare space round the eyes; and the tail is squared. Situation of the third primary well developed in eight species examined, and probably, therefore, throughout the group.

TR. PHÆNICOPTERA : *Col. phœnicoptera*, Latham : *C. militaris*, Tem. : *C. Hardwickii*, Gray (figured in Griffith's 'Animal Kingdom,' VIII. 299) : *Vinago militaris*, Gould's 'Century,' pl. LVIII.* Green. The neck all round, with the breast, bright yellowish-green, having a shade of fulvous; cap, sides of base of neck, and the abdominal region, ash-grey, the belly, with generally some admixture of green, more or less developed, and there is a green tinge on the forehead; shoulder of the wing lilach in the male, and a trace of the same in the female; greater wing-coverts margined with pale yellow, forming an oblique bar across the wing; terminal two-fifths of the tail, ash-grey above, albescens underneath, and its medial portion blackish underneath, and deeply tinged with green above; tibial plumes (extending partly down the tarse) and central abdominal feathers between the tibiae, bright yellow; vent mingled white and green; and lower tail-coverts maronne, with white tips. Beak, whitish; the feet, deep yellow. Length twelve and a half, by twenty-two inches; and of closed wing seven inches to seven and a half.

This is one of three closely allied species, each having its peculiar habitat, and it is intermediate in its colouring to the two others,—namely, *Tr. viridifrons*, nobis, of the Tenasserim provinces, and *Tr. chlorigaster*, nobis, of Peninsular India. *Tr. viridifrons* is distinguished by having the anterior half of the head, and the medial portion of the tail, of the same (and as bright) yellowish-green as the breast, though somewhat less fulvescent; that of the tail being *well defined*, and contrasting strongly both with the grey tip, and also with the grey

* Mr. G. R. Gray identifies this bird with *Col. Stœ. Thomæ* of Gmelin, to which name he assigns the precedence: but I decidedly think that he is mistaken in so doing.—I perceive also that in Griffith's 'Animal Kingdom,' *Col. Stœ. Thomæ* is referred to *militaris* of Temmink; this last named author having stated that *C. Stœ. Thomæ* occurs in India.

coverts impending the tail, so that this green appears as a very conspicuous broad caudal band : the throat also is not weaker-coloured, as in *Tr. phænicoptera*. *Tr. chlorigaster*, on the other hand, has the whole under-parts green ; no trace of green upon the tail, except at its extreme base, and the whole cap and ear-coverts are ashy, devoid (in fine males at least) of the slightest tinge of green on the forehead. These are, in fact, three osculant races, which, if commonly inhabiting the same districts, would doubtless intermix and blend, like *Coracias indica* and *C. affinis*, and likewise certain of the Kâlidge pheasants (*Gallophasian*) ; but within their own proper range of distribution, each continues true to the colouring which distinguishes it from the others. To term them local varieties of the same species, would not merely imply that the three are descended from a common origin, but also that *such* changes of colouring are brought about by difference of locality ; a notion which is inconsistent with the fixity and regularity of markings we observe in either race, over an extensive and diversified range of country. *Tr. phænicoptera* is a very abundant species in Bengal, Assam, Sylhet, Nepal, and all Upper India, its range extending southward at least to the foot of the mountains of Central India, where it would seem to be equally common with the next, and intermediate specimens are met with even in Lower Bengal. In Arracan it does not appear to have been met with, but farther southward, in the Tenasserim provinces, it is represented by its other near affine, *Tr. viridifrons*.*

TR. CHLORIGASTER, nobis, *J. A. S.* 1843, p. 167 : *Tr. Jerdoni*, Strickland, *An.* and *Mag. N. H.*, 1844, p. 38 : *Vinago phænicoptera v. militaris* of Southern India, *Auctorum*. Similar to the last, except in the particulars already mentioned. It replaces *Tr. phænicoptera* in the

* Capt. Hutton writes me word from Mussooree, that *Treron phænicoptera* is "common in the Deyrah Doon, but never mounts into the hills, where it is replaced by *Tr. sphenura*. Many of the Doon birds" he adds, "have come to be regarded as hill species, from their commonly occurring in collections made by residents at the different hill stations. Such collectors, however, entertain one or more *shikarees*, who start off sometimes to the Doon, sometimes to the interior of the mountains, just as they happen to remember or to want any bright-coloured bird ; and when the collection is brought in, the collector never dreams of asking where the birds were shot, but puts them all down together as 'a collection from the hills.' Nepal being further to the south-east than Mussooree, a greater elevation may be required to produce the same temperature that we have ; so that birds, which with us are found *only* in the warm valley of the Doon, may *perhaps* in Nepal rise to a certain elevation on the mountains !"

Peninsula of India, and specimens are occasionally met with in the vicinity of Calcutta. These three species have the feet of a deep yellow colour; whereas in all the other Asiatic Hurrials, they would appear to be bright red.

Tr. bicincta : *Vinago bicincta*, Jerdon, *Ill. Ind. Orn.* Pl. XXI; *Madr. Journ.* 1840, p. 13, (the male); and *V. unicolor*, Jerdon, *ibid.* (the female) : *V. vernans*, var. Lesson's *Traité*. (*Chota Hurrial*, Hind.—Bengal). Green: the forehead and throat, brighter and more yellowish, as are the whole under-parts of the female, passing in both sexes to bright pale yellow towards the vent; occipital region, ash-grey; a stripe of yellow along the wing, formed by the margins of the greater and outer coverts; tail, grey above, with a blackish medial band on all but its middle feathers; beneath blackish, tipped with greyish-white; and its lower coverts, cinnamon-coloured in the male, and mingled dusky-ash and buffy-whitish in the female. The male is further distinguished by having a large buff-orange patch on the breast, and above this a lilach band, broader at the sides. Bill, greenish-glaucous: and the legs deep pinkish-red. Length eleven or twelve inches, by twenty, or nearly so; and of wing generally about six inches, rarely as much as six and a half.

This beautiful species is common to all India, but would seem to be more numerous in Lower Bengal than in the Peninsula; and it occurs plentifully in Nepal, Assam, Sylhet, Tipperah, Arracan, and the Tenasserim Provinces. In Bengal, however, it is much less numerous than *Tr. phænicoptera*; and the flocks of the two species do not commingle. I once found its nest, half-way up a small mahogany tree, in the Calcutta Botanic Garden. The eggs, of a somewhat less lengthened form than in pigeons generally, measured an inch and a quarter in the long diameter. I have also obtained the young, which resemble in colouring, the adult female. The voice is much the same as in *Tr. phænicoptera*.

Mr. G. R. Gray has erroneously identified this bird with *Tr. vernans*, (L.), common in the Malay countries. The latter differs in its smaller size, having the wing but five inches and a half; in the male having the entire crown and throat grey, instead of green; in the very much greater development of the lilach colour above the orange of the breast, this enveloping the whole neck, whereas in *Tr. bicincta*, it is confined to a band above the breast; and in the tail being grey above, with a blackish *terminal* band, and slight greyish extreme tips to the feathers; whereas,

Tr. bicincta has a broad whitish terminal band to the tail, as seen underneath, and which appears of a dull ash-colour above. No two species can be more obviously distinct.

TR. MALABARICA : *Vinago malabarica*, Jerdon, *Ill. Ind. Orn.* (Art. *V. bicincta*) : *V. aromatica*, apud Jerdon, *catal.* (the male); and *V. affinis*, Jerdon, *ibid.* (the female) : also *V. aromatica* of Southern India, Jardine's *Nat. Libr.*, *Columbidæ*. This bird exactly resembles *Tr. nipalensis* in size and colouring, except in having a yellower throat in both sexes; but is at once distinguished by the very different form of its beak, and by having no naked space round the eyes; the buff tinge on the breast of the male is also more decided; and its legs are 'lake-red.' The female may be distinguished from that of *Tr. bicincta*, by the ash-colour of its forehead and entire crown, and by its unspread tail being wholly green above.

Mr. Jerdon's specimens of this bird were obtained on the Western Coast of the Peninsula, and at the foot of the Neilgherries. I have never seen it from Northern India; but to the eastward it inhabits Assam,* Sylhet, Tipperah, and appears to be equally common with *Tr. nipalensis* in the island of Ramree, Arracan.

There is a nearly allied species in the Nicobar Islands, *Tr. chloroptera*, *nobilis*, which differs in its superior size, having the wing seven inches, instead of six to six and a quarter; and in the male having a large portion of the fore-part of its wing green, instead of deep maronne; its breast also is less tinged with fulvous, and the forehead more albescens.

Columba pompadoura, Gmelin, founded on Pl. XIX and XX of Brown's *Zoology* (1776), should be another nearly allied species, inhabiting Ceylon: but as both figure and description represent the back to be green, instead of maronne, like the rest of the mantle; and as it is also described as "smaller than the turtle-dove," it clearly cannot be *Tr. malabarica*, and is probably a sort of representative (as regards its diminutive size) of *Tr. olax* of the Malay countries.

C. SPHENURUS, Swainson : *Sphenocercus*, G. R. Gray. Hurrials with cuneiform tail, of which the central feathers are, in some species, much elongated beyond the rest, and their prolonged tips attenuated; with the basal two-thirds or more of the bill soft and

* It is figured among Dr. McClelland's drawings of the birds of Assam.

tumid ; and with the soles of the toes narrow, whereas in the preceding sections they are particularly broad and flat : a nude livid space surrounds the eyes, but less developed than in the first section ; and the curious character observable throughout the preceding group, of having the inner web of the third primary abruptly sinuated, does not exist in the present one. These birds are exclusively mountaineers, inhabiting the hill-forests, and are remarkable for the music of their notes.

TR. SPHENURA : *Vinago sphenura*, Vigors, *Proc. Zool. Soc.* 1831, p. 173 ; Gould's 'Century,' pl. LVII : *Kokla*, or *Kokhela*, H. (a name also applied to the next species). Very similar in colouring to *Tr. nipalensis* and *Tr. malabarica*, but larger, and at once distinguished by its cuneiform tail ; by the greater development of the soft basal portion of its bill ; also by the green colour tinged in the male with buff of its crown ; by the considerable diminution of the maronne colour on the mantle of the male, especially on the back, the posterior scapularies, the tertaries, and the great wing-coverts, being green ; and by having but a slight pale yellow margin to only the great coverts of the wing. Tail, green above, with an ill-defined subterminal dusky, band to its outer feathers, and uniform dull albescent-grey, underneath ; its lower coverts long, and of a pale rufous-buff hue in the male, yellowish-white with green centres in the female, as are likewise the short outer ones of the male : breast of the latter, deeply tinged with buff. In the female, the subterminal dusky band on the three outer tail-feathers, is much better defined. Irides, coloured as usual ; the bill, and nude skin around the eye, livid ; and legs, coral-red. Wing, seven inches to seven and a quarter : middle tail-feathers, five and three-quarters.

This species inhabits the Himalaya, and is, I believe, more abundant in the south-eastern portion of the chain, as in Nepal and at Darjeeling ; though it is also common at Simla. Capt. Hutton writes, from Mussoorie,—“ This species is very numerous in the hills from April to June, when, having reared its young, and the rains having set in, it becomes scarcer, and gradually disappears during the rainy season. The nest is in high trees, composed of dried twigs, a mere platform ; and the eggs are two, and white. I heard the first *Kooklah* this year on the 12th of April.” It is greatly prized by the natives as a cage-bird, on account of its singularly prolonged and varied musical note, which is an improvement upon that of *Tr. phoenicoptera* and its allies. A few are even brought in cages to Calcutta, and sell at a high price, as song-birds.

I have heard the notes of both this and the next species, which I think are absolutely similar: they bear some resemblance to the human voice in singing, and are highly musical in tone; being considerably prolonged and modulated, but always terminating abruptly; and every time the stave is repeated exactly as before, so that it soon becomes wearisome to an European ear.

TR. CANTILLANS: *Vinago cantillans*, nobis, *Journ. As. Soc.* XII, 166: *Col. aromaticata*, var. A, Latham. Size and proportions of last, but the green colour replaced by a delicate pearl-grey, with a slight tinge of green here and there, more especially on the under-parts: forehead and throat whitish; the crown and breast of the male tinged with ruddy, or weak maronne; and the mantle marked as in *Tr. sphenura*, with deeper maronne: a slight yellowish-white outer edging to the greater wing-coverts. Irides, as usual in this genus, or having a crimson ring encircling a violet one: bill and bare skin around the eye, glaucous-blue: and legs and toes, reddish-carneous. The female I have not yet seen. Length, thirteen by twenty-one inches; closed wing, seven inches.

This species occurs in the N. W. Himalaya, as about Simla; and is, I believe, rare in Nepal. I kept one alive for some time, that was stated to have been brought from Agra; whither it had no doubt been carried from the Hills. Can it be a variety only of the last?

TR. APICAUDA, Hodgson (mentioned in Mr. G. R. Gray's Catalogue of the Ornithological Specimens in the British Museum). Nearly allied to *Tr. oxyura* of the Malay countries, from which it is at once distinguished by the pale yellow margins of its great wing-coverts, forming two narrow longitudinally oblique bars on the wing. General colour green, more yellowish towards the tail, and on the under-parts; and tinged in the male with russet on the crown and breast: primaries, dusky-black: tail with its middle feathers greatly prolonged beyond the rest, and their elongated portion much attenuated; its colour, grey with a medial blackish band, obsolete on the middle pair of feathers, which at base are yellowish-green. Bill, evidently glaucous-blush; and legs red. Length of wing, six inches and a half, and of middle tail-feathers, eight inches or more, passing the next pair by about three inches.

Inhabits the south-eastern Himalaya and the hill ranges of Assam; being tolerably common at Darjeeling.

Genus *CARPOPHAGA*, Selby (1835) : *Ducula*, Hodgson (1836).
Dukul, or *Dunkul*, H. The DUNKALS.

These fruit pigeons are mostly of large size, with broad-soled feet and strong hooked-claws, much as in the typical Hurrials, and a slender, generally somewhat lengthened, bill, having the terminal third only of its upper mandible corneous, and the plumage of the chin advancing very far forward, underneath the lower mandible. In a few species the base of the upper mandible expands to form a fleshy knob. Wings, in all the typical species, adapted for powerful flight. The plumage of the head, neck, and under-parts, and in some species, throughout, is blent and glossless, and mostly of a delicate grey, or a vinous hue, with never the peculiar burnish on the sides of the neck, so general among ordinary pigeons ; but many species have the upper-parts, wings, and tail, shining metallic green, which in some is bronzed or coppery, in others varied with rich steel-blue ; hence, several are among the most shewy of the pigeon tribe ; others, however, being simply black and white, though all are alike handsome when viewed in the fresh state, from the delicate beauty of the irides, bill, feet, and any nude skin about the head, the exquisite colouring of which is lost in the dry specimen. These birds are more especially developed in the great Oriental Archipelago, where the species are very numerous, two only occurring in India, and others in Australia and Polynesia. They are gregarious, like the Hurrials, and keep exclusively to the great forests, more especially to those of upland districts : and it would appear that they do not generally lay more than a single egg, and certain species invariably but one ; in which respect they resemble the celebrated Passenger Pigeon of North America (*Ectopistes migratoria*). At least three sub-genera occur, at the head of which may be placed *Lopholaimus*, G. R. Gray, founded on the *Col. antarctica*, Shaw (v. *dilopha*, Tem.), of Australia ; then follow the ordinary Dunkuls, of which the two Indian species are characteristic ; and finally a short-winged type, with bill and feet as in the former, and colouring as in the division *Chalcophaps* (of the next sub-family), to which I apply the appellation *Dendrophaps*.

C. INSIGNIS : *Ducula insignis*, Hodgson, *As. Res.* XIX, 162 : *Carp. cuprea*, Jerdon, *Madr. Journ.* 1840, p. 12, and subsequently referred by him to *Col. badia*, Raffles, *ibid.* 1844, p. 164. (*Dukul*, Nepal ; *Dunkul*, H). Head, neck, and under-parts, pale ruddy lilach-grey ; the

throat, albescens; and crown, pure cinereous in some specimens, in others tinged with ruddy; back and wings, deep vinaceous-brown; the rump and upper tail-coverts dusky-cinereous, and the lower tail-coverts buffy-white: tail dusky, with its terminal fourth dull-ashy above, and albescens as seen from beneath. Bill, circle of eye-lids, and legs, intense sanguine, except the tip of the bill and the claws, which are horn-coloured; orbital skin, livid; and irides, "hoary or blue-grey," according to Mr. Hodgson,—"red," as stated by Mr. Jerdon. Length, twenty inches, by two feet and a half (Hodgson); nineteen by twenty-six inches (Jerdon); of wing, nine inches and a half; and of tail, eight inches. Weight, a pound and a half. "The female," remarks Mr. Hodgson, "is a fourth smaller than her mate, wants almost wholly the rich vinous tint of the male, and is, generally, more obscurely coloured."

This diversity of colouring of the sexes reminds us of the *Hurrials*: and it may be remarked, that the general tints are not very different from those of *Treron cantillans*. The species inhabits the Himalaya and the Neilgherries; and Capt. Phayre has obtained it in the Ya-ma-dong mountains, which separate Arracan from Pegu. It appears to keep always to a more elevated region than the next species, as near the snow line of the Himalaya; and Mr. Hodgson states that it is "almost solitary" in its habits.

The *Col. badia*, Raffles, *v. capistrata*, Tem., of the Malay countries, would appear to be very closely allied in its colouring, but considerably inferior in size: the two are regarded as distinct by Mr. G. R. Gray.

C. SYLVATICA : *Col. sylvatica*, Tickell, *Journ. As. Soc. II.* 581 : *C. aenea* of India, *Auctorum*; but not of Raffles, *Lin. Tr. XLIII.* 316. (*Dunkul*, H.; *Pyoon-ma-dee*, Arracan.) Head, neck, and under-parts, pearl-grey, purer on the crown and breast, and tinged elsewhere (and occasionally on the crown) with ruddy-vinaceous: back, wings, rump, and tail, shining coppery-green, with a dash of grey on the large alars, and greenest upon the tail; under tail-coverts, dark maronne: chin, and immediately around the base of the bill, white. "Irides and orbits, lake-red; bill slaty, at base above red, at tip bluish-white; legs lake-red." (Jerdon.) Another observer describes the irides to be "deep pink;" but Capt. Tickell writes—"Eyes, orange; feet, rose-coloured; bill, horny, bluish over the nostrils." Length, eighteen or nineteen inches; expanse, two

feet and a half ; closed wing, nine inches to nine and a half ; and tail, six inches to six and a half : scxes alike.

"This fine species," remarks Mr. Jerdon, "is found in all the lofty forests of the west coast, single or in small parties of three or four. It has a single, low, plaintive note." Capt. Tickell, in his 'List of birds collected in the jungles of Borabhûm and Dholbhûm,' states that it is "common in some parts ; preferring the open and large-timbered tracts. They are wild and difficult of approach, and go generally in small parties of four or five. The voice is deep, and resembles groaning." I have never seen it from the Himalaya ; but it is very abundant in the hill regions of Assam, Sylhet, Tipperah, and Arracan ; also in the Tenasserim provinces ; and the Asiatic Society has received it from Java. A writer in the 'Bengal Sporting Review' (No. II. p. 89,) observes—"The habits of this handsome bird are strictly arboreal ; it is seldom seen but in the depths of the jungle ; is gregarious, like the Hurrials, but is only a cold weather resident in the eastern districts of Bengal, and breeds elsewhere.* It makes its appearance in November, and leaves towards the end of March. Its favourite food consists of the bijer plum (*Ziziphus jujuba*), and a jungle berry, called by the natives *Anygootah*. When wounded, it evinces more spirit than the *Columbidæ* appear generally to possess ; erecting the feathers of its head and neck, and buffeting with its wings the hand that captures it. The note is harsh, not unlike the croaking of a bull-frog."

There are several closely allied species : *C. aenea*, as figured (*i. e.* the head,) by Mr. G. R. Gray, in his illustrated work on the 'Genera of Birds', has a large round knob at the base of its upper mandible, of which the Indian species never presents the slightest trace ; and a beautiful specimen before me, from Borneo (?), exhibiting this knob, differs also from the Indian species in several other particulars.† Another, from the same region, exactly resembles the Indian species, except in its inferior size, having the wing but eight inches, and the rest in proportion ; this is doubtless the *C. aenea* of Raffles's list, described as "exceeding fifteen inches in length" : so that, in Sumatra, there would appear to be closely allied diminutives of both the Indian species. *C. perspicillata* of Java and the Moluccas also approximates a good deal, but is readily enough distinguishable.

* Mr. Frith found a nest of this bird in the Garrow hills.

† It seems to be the "Sumatran Pigeon, No. 12," of Latham.

Of the third great genus of fruit-eating pigeons, *Ptilinopus*, also largely developed in the eastern Archipelago and Polynesian Isles, no Indian species has been discovered; the *Pt. Elphinstonii* of Sykes (seemingly) appertaining to the same group of ordinary pigeons as the British Cushat or Ring-dove.

Sub-fam. GOURINÆ, *Ground Pigeons.*

The great series of ground pigeons and ground doves, presents a marked gradation in form and character, from genera allied (excepting in the form of the feet) to the *Carpophagæ* and *Ptilinopodes* of the preceding sub-family, to others which exhibit a nearer relationship to the species of the next sub-family. The size also varies remarkably, as both the largest and smallest pigeons known, are comprised in this group; some attaining the magnitude of a hen-turkey, while others are scarcely bigger than a sparrow. These birds are of a shorter, more full, and grouse-like figure, than that of other pigeons, having the wings more or less rounded, and even bowed or hollowed in some instances; the tarsi comparatively elongated, and the toes long and adapted for ground habits. Some even much resemble partridges in their mode of life: but even these, for the most part, prefer the cover of low brush-wood (as do also many partridges), the haunts of different species varying; and other genera are completely sylvan in their abode, feeding on the ground, more especially on fallen fruits and berries. Such are the magnificent Gouras, or great crowned pigeons (*Goura coronata* and *G. Stoursii*.) of the Moluccas and New Guinea, which in their plumage and colouring approximate *Treron cantillans* and *Carpophaga insignis*; and the elegant hackled ground pigeons (*Calœnas*), one of which (*C. nicobaricus*) abounds in the forests of the Malay peninsula, and in the Nicobar, Andaman, and Cocos Isles, thus almost verging on the eastern boundary of the territory whose fauna we here treat of. The general resemblance of this bird to *Ptilinopus* is striking in the living specimens of both; and from what I have observed of it in confinement, I have great reason to doubt the current statement that it ever lays more than two eggs, the number so usual in the pigeon family: indeed, I think there is present reason to be sceptical of the statements that any pigeon lays more than that number; though it is certain that several of the *Gourinæ* are clad with down at an early age, and follow their parents

soon after they are hatched. The only Indian species is among the least characteristic of the tribe, so much so, that it requires some knowledge of its various Australian affines to comprehend its classification in the present group. It ranks under

CHALCOPHAPS, Gould, (apparently a sylvan sub-genus of *Phaps*, Selby, exemplified by the common Bronze-wing of Australia).

CH. INDICA : *Columba indica*, Lin. : *C. pileata*, Scopoli : *C. javanica* (?), *cyancephala*, et *albicapilla*, Gmelin : *C. cyanopileata*, et *griseocapilla*, Bonnaterre : *C. superciliaris*, Wagler. (*Rám-G'hoogoo* and *R'háj-G'hoogoo*, Bengal; *Gyo-nygo*, Arracan.) Back and wings, emerald-green, glossed with aureous; the feathers distinct and scale-like: neck, breast, and under-parts, vinaceous-brown, paler below, and of a duller hue in the female; two broad dusky bars, alternating with greyish-white, on the rump: tail, dusky in the male, its outermost and penultimate feathers whitish-grey, with black subterminal band: primaries, dusky: forehead of the male, white, passing as a supercilium over the eye; the crown of the head, ash-grey: a white bar near the angle of the wing; and lower tail-coverts, ashy, the longest, brown-black: inside of the wings, reddish cinnamon-brown. The female has a greyish-white forehead, much less developed than in the other sex, and a narrow whitish supercilium; crown of the head, rufescent; no white bar at the shoulder of the wing; the tail tinged with ferruginous; and the neck and under-parts are browner than in the male. Irides, dark: bare skin around the eyes, deep purplish-carneous, as are also the legs; and the beak is bright coral-red, except towards the nostrils, where somewhat dusky. Length, ten inches and a quarter, by seventeen and a half: and of wing, five inches and a half to five and three-quarters.

This beautiful ground-dove is common in thick jungly situations, and especially among dense bamboos, throughout the country; and it is equally abundant in the Malayan Archipelago. A writer before cited, remarks,—“ The rapidity of flight it exhibits, exceeds that of any bird I am acquainted with; except, perhaps, the brief decisive swoop of some of the smaller *Falconidæ*: as in the progress of the latter, there is no apparent motion of the wings, but gliding along a few feet from the ground, diverging or rising just sufficiently to clear intervening obstacles, the ground dove skims with an arrow-like swiftness, and is come and gone in an instant; scarcely giving the eye time to detect what has crossed the field of vision. When settled on the ground, however, it shews no

unusual degree of fear, and may be approached near enough to notice its motions and brilliancy of colouring. Bare spots about the roots of large trees, particularly of the tamarind, appear to be favourite resorts; and a pair will be occasionally found sunning themselves, arranging their plumage and scraping up the earth, and beating up the dust with expanded wings, after the manner of the *Rasores*, upon an old *b'heetah*—the artificially raised mound of a deserted village. They soon become reconciled to confinement; and the voice is plaintive and monotonous, like an oft-repeated low tone on a distant flute."* The nest of this species I have never seen, but am informed that it is built in low thorny trees, and often in bamboo jungle: the eggs are two in number; and one taken from the oviduct (April 30th.) measures just an inch long by three-quarters of an inch across, and is of a less pure white than those of ordinary pigeons and doves.

There is a nearly allied species in Australia, the *Col. chrysochlora*, Wagler, which Mr. G. R. Gray conceives to be the true *Col. javanica* of Gmelin. One character by which it may always be readily distinguished, is the total absence of white on the forehead of both sexes. The rapidity of flight so remarkable in the Indian species, as compared with our other *Columbidæ*, is equally observable in other sub-genera of *Phaps*; which might include even *Peristera* of Swainson.†

Sub-fam. COLUMBINÆ.

This consists of the ordinary pigeons and doves, the characters and habits of which are familiar to all. They are mostly arboreal, though

* "Columbidæ of the Eastern Districts."—*Bengal Sporting Review*, No. IV, 1845.

† A curious pigeon, in the guise of a *Pterocles*, is figured among the drawings prepared under the superintendence of the late Sir Alexander Burnes and Dr. Lord, marked *Fahktuk* (i. e. *Facktah* or dove, *Hind.*), from Cabul, which should be sought for in the Scindian deserts. Total length about a foot, the wing six inches and a half, and tail pointed and *Pterocles*-like, extending nearly two inches beyond the tips of the wings: tarsi and toes, which, though rudely drawn, would appear to be those of an ordinary pigeon, naked, and of a pink colour. Bill dusky, being also apparently that of an ordinary pigeon, and rather slender. General colour light isabelline, with darker margins to the feathers of the mantle and wings; neck, breast and under-parts, plain, the breast rufescent, and the belly and lower tail-coverts whitish; the outer tail-feathers would appear to have black tips; irides crimson. Should this hereafter be verified, and constitute (as seems probable) a new genus of sand-doves, having the habits of the Gangas or Sand-grouse, it might bear the name *Psammænas Burnesii*.

many of them feed much on the ground, chiefly on grain and oleaginous seeds ; some of the species also nipping the young sprouts of vegetables. They fall into two principal and nearly allied series, those of the pigeons and the doves ; the latter subdividing into several well marked groups.

Genus *COLUMBA*, Lin. (as restricted). PIGEONS. (*Kubbooter*, H. ; *Paira*, B.)

These are of comparatively large size, and generally more robust in make, with square or subquadrate tail. The Indian species fall into two subgenera, viz.—rock pigeons, and wood pigeons : the former exemplified by the common house pigeon, the latter by the common Cushat of Europe.

ROCK PIGEONS. In these, the tarse is rather longer, and the toes are better adapted for walking on the ground. They rarely, if ever, perch on trees, except under peculiar circumstances, as when a dove-cot of domestic pigeons is placed near a tree, with large and conveniently shaped boughs, in which case the pigeons will commonly resort to the latter to sit and roost, but never to form their nests. In the wild state, it is probable that they never perch at all ; retiring to roost and nestle in caverns and small hollows of rocks or sea-cliffs, in the absence of which they select buildings that offer suitable recesses, breeding in the capitals of pillars, and whatever other convenient nooks they find. Hence, when unmolested, these house pigeons soon become familiarized with man, and require little encouragement to merge into the domestic condition.

C. intermedia, Strickland, *An. and Mag. N. H.* 1844, p. 39 : *C. ænas* of India, *Auctorum* : *C. ænas*, var., from Tartary, Wagler. (*Jalalaya*, H. ; *Parwa*, Mahr. ; *Golah*, of the pigeon-dealers.) (INDIAN ROCK PIGEON.) The common wild blue pigeon of India is most closely allied to the European *C. livia*, but is of rather a deeper slaty-grey, with invariably a deep ash-coloured rump ; whereas *C. livia* has, as constantly, a pure white rump : there appears to be no other distinction between them ; unless it be that the play of colours on the neck is finer in the Indian bird. The same difference in the colour of the rump is observable in the domestic pigeons of the two countries, whenever these tend to assume the normal colouring ; for the tame Indian pigeons are as clearly derived from the wild *C. intermedia*, as those of Europe are from *C. livia*.

Colour slaty-grey, darker on the head, breast, upper and lower tail-coverts, and tail, which last has a blackish terminal band not well

defined; nuchal feathers divergent at their tips, and brightly glossed with changeable green and reddish-purple; two black bars on the wing*; the primaries tinged with brownish, and the outermost tail-feather having its external web gradually more albescent to the base. Irides, brownish-orange; the lids bluish-white: bill black, with a white mealiness at the tumid base of its upper mandible: and legs reddish-pink. Length, thirteen by twenty-three inches; of wing, eight inches and three-quarters.

Mr. Jerdon rightly remarks—"The blue pigeon abounds all over India, being occasionally found in the more open spaces of jungles, especially in rocky districts, and in the neighbourhood of water-falls; but more generally in the open country, inhabiting walls of villages, pagodas, wells, and any large buildings, and breeding chiefly in old walls." Another observer, writing of it in the eastern districts of Bengal, remarks,—"Large colonies of these birds inhabit every moogur, mhut†, and mass of ruins in the country, where, in company with the (house)

* In some specimens, particularly among the semi-domestic, slight dusky streaks occur on the shafts of the lesser wing-coverts, which, in the latter, are often much more developed, spreading across the feathers and spotting the whole wing: such birds much resembling (except in the rump not being white) a race of wild pigeons that are abundantly brought at times to the London markets—all of them shot birds; but the latter have not, in addition, the two black bands on the wing well defined, as seems to be regularly the case with this variety of *C. intermedia*. Moreover, in the English bird, the spotting of the lesser wing-coverts does not occur on the shafts of the feathers, but partly margins each web, excepting near the edge of the wing, where the feathers are unspotted. I suspect that the wild rock pigeons of the south of England are mostly of the kind alluded to, which may be designated *C. affinis*; while those of North Britain, and it would seem of Europe generally, are true *C. livia*.

Here, again, we have three closely allied species, analogous to the three yellow-footed Hurrials, *Treron viridifrons*, *Tr. phoenicoptera*, and *Tr. chlorigaster*; and if they are to be regarded as mere varieties of the same, what limits can be assigned to the further variation of wild species? *Col. leuconota* is but a step more removed, and I doubt not would equally merge and blend with the others in a state of domesticity. Equally allied are—*Treron sphenura* and *Tr. cantillans*; *Tr. apicauda* and *Tr. oxyura*; and if we grant also some variation of size, we have *Tr. bicincta* and *Tr. vernans*; *Tr. malabarica* and *Tr. chloroptera*; *Turtur chinensis* and *T. suratensis*; *T. meena* and *T. auritus*; &c. &c., which might be regarded as local varieties of the same, and we might thus go on reducing species *ad infinitum*, with no useful definite result, but to the utter confusion of all discriminative classification. However closely races may resemble, if they present absolute and constant differences, whether of size, proportions, or colouring, and if they manifest no tendency to grade from one to the other, except in cases of obvious intermixture, we are justified in considering them as distinct and separate; and more especially, if each, or either, has a wide range of geographic distribution, without exhibiting any climatal or local variation.

† Rude Hindoo temple.

mynah and (rose-ringed) parroquet, they multiply to a vast extent; and the more so, as being held in religious veneration by some, and in special favour by all natives, their destruction is prevented wherever there exists the power. They are so devoid of timidity, that even in the midst of crowded cities, they will build on the cornices in the open verandahs of inhabited houses. When this takes place in the dwelling of a native, their tenure is secure; as their making such selection is looked upon as a happy omen, and their dismission as the sure fore-runner of evil fortune. Pairs frequently take up their quarters among the domestic pigeons of the dove-cot; indeed, it is not an easy matter to prevent their doing so, and intermingling the breed. In the cold weather, they flock and frequent the paddy-stubble in large numbers.* Capt. Hutton informs me that this bird "is found in Affghanistan, where, as in many parts of India, it builds in wells and ruined buildings: the *kazeezes*, or Artesian wells of Affghanistan, are sometimes crowded with them. They occur also in the Doon, and are known as the common blue pigeon. At Mussoorie, I have only seen them in the cultivated fields, low down on the sides of hills, in warm situations."

Being the original stock of the domestic pigeons of India, some notice of the latter should here be introduced. I have not, however, paid much attention to the several varieties; the more choice of which are, besides, kept chiefly by the Moguls in the Upper Provinces, and it is there that observations should be recorded of them. A chapter is devoted to the rearing of pigeons in the *Ayeen Akbaree*, and a number of breeds or races enumerated; but nothing definite can be understood of their distinguishing characters. The different kinds are chiefly esteemed for performing sundry aerial evolutions, and returning at once from any height at an accustomed signal. But to quote the work cited:—"There are also many other beautiful pigeons, which, although they neither wheel nor tumble in the air, yet perform many pleasing tricks; amongst these are the following,—The *Kowkh*, which seems to say the words *yak-roo*. The *Luckeh* [*fantail*], whose cooing is very agreeable, and he carries his head with astonishing pride and stateliness. The *Lowtun*, who upon being shaken, and then put upon the ground, jumps about with strange convulsive motions." (This may be seen at any of the Calcutta bird-dealers; shaken two or three times in the hand, and the head more

* "India Sporting Review," No. IV, 121.

especially, the poor bird tumbles about in a fit for some seconds, when the owner recovers it by blowing hard in its face. They are chiefly black and white, and bare-legged, with a crested occiput; but present no other marked distinction.) "The *Kehrnce*, who has such amazing affection for his hen, that when he has flown out of [human] sight, if she is exposed in a cage, he instantly drops down upon it: they descend either with both wings spread, or with one open, or else with both shut. The *Ruhtek*, is a pigeon famous for carrying letters: but any pigeon may be taught to do this. The *Neshwaree* ascends in the air till he is out of sight, and remains so [i. e. absent?] for a day or two, after which he alights on the ground. There are also many other kinds that are valuable only on account of their beauty, such as the *Sherazee*,* the *Shushtree*, the *Shashenu*, the *Jougeeah*, the *Rezehdehn*, the *Muggessee*, the *Komeree*, and the *Gowlah*: the last [or *intermedia* in its natural state] is a wild pigeon, of which, if a few are taken, they are speedily joined by a thousand others of their kind. There are people who obtain a livelihood by sending these pigeons to feed abroad, and making them vomit up the grain, by giving them water strongly impregnated with salt. A pigeon is said to live to the age of thirty years." *** Among the kinds commonly bred about Calcutta, are fine *Powters* (*Gulla-p'hoola*†), both feather-legged and bare-legged; *Fantails* (*Luckah*) of indisputable merit, but poor helpless monstrosities, except in the eyes of *connoisseurs*, some of which have at least thirty-six tail-feathers‡; and races with an occipital top-knot (*Nuns*), are common: but I have seen nothing like the variety commonly bred by English *fanciers*, and the races generally are less pure (at least in Lower Bengal), with their peculiarities not so strongly brought out; unless in the instance of the *fantails*, and sometimes *powters*, which are as preposterous caricatures of the wild race, as the most extravagant admirer of Nature's freaks of the kind could reasonably desire, and as undeniably curious in shewing what domestication can produce.

C. LEUCONOTA, Vigors, *Proc. Zool. Soc.* 1831, p. 22; Gould's 'Century,' pl. LIX. (HOODED ROCK PIGEON.) Size and form of last, the wings a

* *Sarajoo*, Beng. A large black pigeon, with white rump, quills, and under-parts from the throat; generally, very true to this colouring.

† 'Swollen throat,' or, literally, *full gullet* (*gula*.)

‡ While drawing up this notice, I visited the bird bazar, and counted thirty-four feathers in a tail which was obviously imperfect.

trifle longer : cap, comprising the throat and ear-coverts, ashy-black : neck, rump (as in *C. livia*), and the entire under-parts, white, with a faint shade of ashy, except on the rump, deepest on the lower tail-coverts : interscapularies, scapularies, and wings, light brownish-grey, purer pale ashy on the medial coverts of the wings ; the primaries dull-blackish towards their tips, the secondaries broadly tipped with dusky, and the tertiaries and their coverts having a subterminal dusky band, and broad greyish tips, producing a series of three short bars, successively smaller to the front, and a trace of a small fourth band anteriorly : tail and its upper coverts ashy-black, the former having a broad greyish-white bar, occupying the third quarter from the base of its middle feathers, and narrowing and curving forward to reach the tip of its outermost feathers. Bill, black : legs, pinkish-red : and irides, yellow. Common on the rocky heights of the Himalaya, inhabiting near the snow line.

According to Capt. Hutton, there are two races, if not species, confounded under *C. leuconota* ; viz.—the true *leuconota*, as figured by Gould, with the white of the *hind-neck* spreading a considerable way down the back, and which (he informs me) is found only “far in the mountains ;” and another, of which the description wholly corresponds with the Nepal and Darjeeling specimens which have served for the above description, and which Capt. Hutton states—“ inhabits the Doon all the year, but is there called ‘Hill Pigeon,’ while the other is known to collectors as the ‘Snow Pigeon.’ The Doon bird flies in small flocks during summer from the hills to the Doon in the morning, and returns to the hills in the evening.” If there be really any difference, however, between the birds adverted to, I suspect it must be merely one of age.

Subgenus PALUMBUS, Kaup. WOOD PIGEONS or CUSHATS. These have feet well adapted for perching, and a shorter tarse than in the preceding section, which also is more feathered towards the knee. They nidificate and habitually perch on trees.*

C. PALUMBUS, Lin. (EUROPEAN WOOD PIGEON.) Upper-parts brownish-grey, the head, cheeks, throat, rump, and upper tail-coverts, pure ashy, paler on the lower tail-coverts ; fore-neck and breast vinaceous-ruddy, weaker on the belly, and albescent towards the vent : nape, and sides of

* It should be remarked, that the European *C. œnas* is completely intermediate to these two groups, in its form, colouring, habits, and nidification : it breeding sometimes in the cavities of trees, sometimes in rabbit-burrows.

the neck and shoulders, glossed with changeable green and reddish-purple, the former predominating above, the latter below ; and upon each side of the neck a great patch of subdued white, in general largely developed, very rarely reduced to a mere trace : coverts forming the edge of the wing, and impending the winglet, white, as is also the exterior margin of each primary : tail grey at base, becoming blackish at its tip. Bill orange, with a white mealiness at the tumid base of its upper mandible : feet red : and irides light yellow. Length, seventeen by thirty ineches ; and wing nine inches and a half.

This well known European species inhabits the north-western Himalaya, as about Simla, and in the Alpine Punjab.

C. (?) *ELPHINSTONII* : *Ptilinopus Elphinstonii*, Sykes, *Proc. Zool. Soc.* 1832, p. 149 : a *Carpophaga*, apud G. R. Gray. (NEILGHERRY WOOD PIGEON.) "Upper-parts fuscous-brown ; the head, neck, and lower-parts, ashy ; nape black, the feathers marked with a white spot at tip ; interscapularies ruddy ; neck and breast glossed with emerald-green, the rump with ashy ; 1st, 2nd, 3rd, 4th, and 5th primaries, having their outer web emarginated. Irides oehre-yellow." Length, fifteen or sixteen inches.

I have had no opportunity of examining this fine species, but from the above description of its plumage, translated from Colonel Sykes's brief Latin definition, I cannot help doubting exceedingly the propriety of arranging it as a *Carpophaga*, and as strongly suspect that the present is its true systematic station. Colonel Sykes describes it to be "a rare bird in the Dukhun, met with only in the dense woods of the ghauts. Not gregarious. Stony fruit found in the stomaeh. Sexes alike. Flight very rapid. The lateral skin of its toes is very much developed." Mr. Jerdon has only noticed it "in the dense woods on the summit of the Neilgherries, in small parties, or single. It is a retired and wary bird. I found various fruits," he adds, "and small shells, in its stomach."

C. *PULCHRICOLLIS*, Hodgson, (mentioned in Mr. G. R. Gray's catalogue of the specimens of *Columbidæ* in the British Museum). (ASHY WOOD PIGEON.) Considerably smaller than the two preceding species ; and general colour dusky-grey, much paler and faintly tinged with lake below, more or less whitish towards the vent, and subdued white on the lower tail-coverts : tail blackish : head, cheeks, and car-coverts, pure light ashy, passing to whitish on the throat : the sides of the neck and breast,

brightly glossed with the usual changeable green and reddish-purple, the former predominating ; and above this the feathers are somewhat rigid, and black at base, with broad isabelline tips, whitish at the end, forming a large patch on each side confluent behind. Corneous portion of the bill, apparently pale yellow : and legs probably pink, but fading to amber in the dry specimen, of which colour are also the claws. Length of wing eight and a half to nine inches. Common in the wooded region of the eastern Himalaya.

C. PUNICEA, Tickell, *Journ. As. Soc.* XI, 462.* (POMPADOUR WOOD PIGEON.) General colour deep vinaceous-ruddy, weaker below, and most of the feathers margined with glossy changeable green and amethystine-purple, the former colour prevailing on the neck and sides of the breast, the latter elsewhere : whole top of the head, including the occiput, whitish-grey : alars and caudals blackish ; the primaries tinged externally with grey : upper and lower tail-coverts nigrescent : bill yellow at tip, its basal half blackish in the dry specimen : " irides, orange with a red outer circle : feet dull lake." Length, about sixteen inches ; of wing eight inches ; and tail, seven inches.

This handsome pigeon inhabits the hill forests of Central India, also those of Assam, and would appear to be tolerably common in the Island of Ramree, Arracan. I have never seen it from the Himalaya.

C. HODGSONII, Vigors, *Proc. Zool. Soc.* 1832, p. 16 : *C. nipalensis*, Hodgson, *Journ. As. Soc.* V, 122.† (SPECKLED WOOD PIGEON.) Above, dark vinaceous-ruddy, with white specks on the medial coverts of the wing : head and upper-part of front of neck cinereous, with a vinous tinge in some specimens : rump, upper and lower tail-coverts, dusky-ash : tail ashy-black ; the great alars brownish-dusky, the first three primaries having a slight whitish outer margin in some specimens ; and the exterior wing-coverts are greyish : nape, sides of neck, and lower parts, vinaceous-ruddy at base of feathers, margined (more broadly on the side of each feather of the breast) with vinous-grey, which increases in quantity upwards, till the surface of the plumage appears solely of this hue ; while the dark vinous tint predominates more and more towards the belly ; the red portion of each feather appears thus as an obtusely pointed spot upon those of the breast, and on the feathers of the neck

* Type of *Alsocomus*, Tickell.

† Type of *Dendrotreron*, Hodgson.

is darker and acutely pointed, being there uniformly edged with the pale ashy margin. Bare orbital space livid : bill, purplish-black : " irides hoary, or grey-white : legs and feet black-green to the front, yellowish elsewhere ; claws clear lively yellow." Length, about fifteen inches, by twenty-five or twenty-six inches in alar expanse ; wing nine inches to nine and a quarter. " Female," according to Mr. Hodgson, " rather less, and differing in having the bluish-grey of the head less pale and clear, and in wanting almost entirely the purplish tinge which adds so much beauty to certain parts of the plumage of the male, as especially the upper part of his back, and the lower part of his belly."

" This elegant species," continues Mr. Hodgson, " is found in the woods of the valley of Nepal. It is very shy, seldom or never entering the cultivated fields for the purpose of feeding, but keeping almost always to the woods, and living upon their produce, in the shape of grass, seeds, or berries." It would seem to be not uncommon near Darjeeling : and Captain Wroughton informs me, that it is also tolerably numerous about Simla and Mussooree, where it frequents the pine forests on the higher mountains, as Whartoo and the vicinity of Kotghur. They are generally seen in flocks of six or seven, which are particularly shy and difficult of approach.

C. Hodgsonii is nearly allied to *C. arquatrix* of Southern Africa ; but is at once distinguished from that bird by its blackish bill, by the grey upon its head and neck, and by the reduced development of the nude space surrounding the orbits. Another allied African species, is the *C. guinea*, Lin. (*v. trigonigera* of Wagler).

The DOVES—

Are generally smaller and more delicately formed, with the tail commonly more or less lengthened and graduated, this latter character attaining a high degree of development in certain groups of them. The nearest approach to the wood pigeons is exhibited by the North American passenger doves (*Ectopistes*, Sw.), which are especially characterized by having a long, much graduated, and sharp-pointed tail, and powerful wings, of which the first two primaries are equal and longest ; they have the true pigeon-like play of colours on the sides of the neck. The African *Aena capensis* has been generally placed near *Ectopistes*, but (so far as can be judged from drawings,) would appear rather to approx-

imate certain of the *Macropygiae* of the Eastern Archipelago, as *M. Reinwardtii*. To the last named group, one Indian species appertains.

- *MACROPYGIA*, Swainson : *Coccyzura*, Hodgson. (CUCKOO-DOVES.)

The species of this division are remarkable for their very broad, long, and much graduated, tail, and general Cuckoo-like figure. They chiefly inhabit the great Eastern Archipelago, a single species occurring in the Himalaya, and another in Australia. For the most part, they are confined to rocky upland forests, and subsist much on berries, often descending to the ground to pick up fallen mast and fruits : upon being disturbed, their great broad tail shews to much advantage, as they rise. The species of the Archipelago are very injurious to the pepper and other spice plantations ; and their flesh is highly esteemed for the table, from the fine flavour said to be imparted to it by the various aromatic berries on which they feed.

M. LEPTOGRAMMICA. *Col. leptogrammica*, Temminck, *pl. col.* 248 : *Coccizura tusalia*, Hodgson, *Journ. As. Soc.* XIII, p. 936. (RAYED CUCKOO-DOVE.) Upper-parts dusky, with numerous narrow rufous bars on the mantle, wings, rump, and upper tail-coverts ; tail more obscurely barred in the male : forehead, chin, and throat, whitish, tinged with lake : the occiput, neck, and breast, dull pale vinaceous, glossed (less brightly on the breast) with changeable green and amethystine-purple : lower-parts yellowish-albescens, the under tail-coverts pale buff ; all but the four middle tail-feathers ashy, with a broad black subterminal band ; and above this band, the exterior web of the outermost tail-feather is whitish. Female having the tail barred with narrow rufous cross-lines, like the rest of the upper-parts ; and the fore-neck and breast are similarly rayed with alternate dusky and pale buff. The tail-feathers, more especially of the female, have their inner webs rufous at base. Bill black : cere, orbits, and legs, red. Wings seven and a half to eight inches ; middle tail-feathers the same, the outermost four inches and a half.

The above descriptions are taken from a fine characteristic male and female : considerable variation of plumage occurring, as many specimens are in different degrees intermediate. This bird inhabits the eastern Himalaya, and is common at Darjeeling.

TURTUR, Selby. (THE TURTLE-DOVES.) (*G'hoogoo*, Bengal ; *Fachtah*, H. ; *Gya*, Arracan.)

Small and delicately formed tree-pigeons, with the tail moderately graduated, or merely rounded, having always broad grey, or greyish-white, tips to its graduating outer-feathers; neck devoid of iridescent gloss. They feed chiefly on the ground, upon grain, small pulse, and oil-seeds; assemble in small flocks except when breeding, and generally prefer groves and coppices which intersperse the open country, coming much into gardens, where sometimes they may be seen nearly as familiar as domestic pigeons. In such situations they breed abundantly, constructing the slight platform nests common to all arboreal *Columbidæ*; and in warm climates, they have no special season for propagation, but produce alike at all times of the year, the same as domestic pigeons. As compared with the large true wood pigeons, these birds are certainly much more terrene in their habits*; but they grade towards the wood pigeons in *Turtur picturatus* (*V. Dufresnii*) of the Isle of France, which, however, is a true turtle-dove, having merely a larger bill than its congeners. Their geographical range is confined to the Old World, inclusive of Australia; and the only Australian species (*T. humeralis*) is coloured like the *Geopelia*; which last are indeed but a sub-genus of the present group, consisting of smaller and more slender-formed species, with delicate rayed plumage, and which are confined in their distribution to the Malay countries and Australia.†

T. RISORIUS: *Col. risoria*, Lin. (*Kālhāk*, *Kāhālāk*, *Kahalaki*, or *Pánr G'hoogo*, Beng.; *Dhor Fachtah*, S. India.) (GREY TURTLE-DOVE.) Uniform light grey-brown; the edge of the wing, and lower tail-coverts, pure ashy, somewhat deeper on the latter; head delicate pale vinous-grey, whiter on the forehead and throat; the nape and under-parts less ashy, and more vinaceous, passing to light greyish towards the vent; a narrow black half-collar on the hind-neck; primaries dusky, with slight whitish margins bordering their tips; and closed tail uniform with the back

* They resemble the generality of more dove-like *Gourinæ* (as do also the Rock Pigeons), in having the outer toe shorter than the inner; which, accordingly, would indicate a terrene propensity.

† *G. striata* (v. *Col. sinica*, *malaccensis*, *bantamensis*, &c.), common in the Malay countries, appears also to inhabit the Mauritius. Living specimens are occasionally brought to Calcutta, where I have kept both it and *T. humeralis*; and being thus familiar with both, I do not agree with Messrs. Gould and G. R. Gray in making a *Geopelia* of the latter. It serves, however, to show the immediate connexion of the two sub-groups.

above, all but its middle feathers successively more distinctly marked with black about the middle, passing into greyish on the basal half, and to white on the terminal, successively more strongly pronounced. Irides crimson; bare orbital skin white; the bill black; and feet dark pinkish-red. Length thirteen inches by twenty or a trifle less; wing six inches and a half, or sometimes rather more.

Common and generally diffused, frequenting hedges and trees in the neighbourhood of cultivation, and even low bush-jungle: it inclines more to be gregarious than the other species. To the eastward, however, it seems to be unknown in Arracan. According to Mr. Strickland, the identical species occurs in Northern Africa; and it is likewise stated to inhabit the south-eastern part of Europe, as Hungary, Turkey, and the Islands of the Lower Danube.* In Southern Africa, it is replaced by a nearly allied species, the *Col. vinacea*, Gmelin, to which Mr. G. R. Gray refers *T. erythrophrys* of Swainson; while Mr. Strickland identifies the latter with *T. risorius*, and considers *T. semitorquatus* of Swainson to be the *vinacea*.† Mr. Gray, again, does not mention *semitorquatus* of Swainson, but gives *semitorquatus*, Rüppell, as distinct from either. *T. vinaceus* is distinguished from *T. risorius*, by its generally much darker colour, by having the under tail-coverts whitish instead of deep ash, by its much broader black nuchal semi-collar, and by its winglet and primary-coverts being dusky instead of pale ash-grey. It is also rather smaller than the Indian species; in which respect, and in the breadth of the nuchal half-collar, the common tame cream-coloured (or pale buff-backed) doves, which are abundantly bred in captivity both in Europe and in India, agree with the South African, rather than with the wild Indian species. As for Swainson's two alleged species, I can identify neither of them satisfactorily; his figure of *T. erythrophrys*, is evidently faulty in the colouring; but he speaks of "the belly, flanks, vent, and under tail-coverts, as "clear cinereous," which should distinguish it from *T. vinaceus*, while its "broad black semi-collar, margined by a narrow cinereous line," instead of a slight greyish-white one, should equally

* *Bull. de l'Acad. des Sciences de Saint-Petersburgh*, 1837, No. 46; as quoted in the *Rev. Zool. par la Société Cuvierienne*, 1838, p. 293.

† Vide Strickland, in *An. & Mag. N. H.* 1844, p. 38; Gray's illustrated 'Genera of Birds'; and Swainson's 'Birds of West Africa,' Vol. II., *Nat. Libr.*

separate it from *T. risorius*; again, "the orbits are naked and rich red," which applies to neither of them: his *T. erythrophrys* has the wing seven inches, and his *T. semitorquatus* only five inches and a half; both the Indian and South African species being in this respect intermediate. *T. semitorquatus* has, further, "the belly, vent, thighs, and under tail-coverts, cinereous-white," which agrees sufficiently with some specimens, apparently females, of *T. vinaceus*, the (presumed) males having at least the abdomen scarcely paler than the breast; but "above all, the inner toe is one-twentieth of an inch *longer* than the outer," whilst "in *erythrophrys*, this proportion is almost reversed, or at least the inner toe is not even equal to the outer." In both the Indian and South African birds, the inner toe is shorter than the outer.

Besides the common cream-coloured domestic race, a small albino variety is frequently bred in cages, in different parts of India, with wing measuring five and a half to six inches; but its form of tail and other proportions are as in *T. risorius* and *T. vinaceus*. This bird is often interbred with the cream-coloured race, producing offspring of intermediate size, and shade of colouring.* The *coo* of *T. risorius* somewhat resembles the sound *cuckoo*, pronounced slowly, and with a pause between the syllables, the second being much prolonged and at first rolled. It may not unfrequently be heard in moonlight nights.

T. HUMILIS: *Col. humilis*, Temminck: *Asiatic Pigeon*, Latham. (*Serotee Fachtah*, Hind.; *Golabee*—or rose-coloured—*G'hoogoo*, *Támá-khüree*—or copper-cup,—and *I'tküiyá*—or brick-coloured—*dove*, Beng.; *Goodko*—*G'hoogoo*? i. e. *dove*,—*Scinde*; *Gyo-leng-bya*, Arracan.) (RED TURTLE-DOVE.) Much smaller and of a less elongated form than the last; and general colour fine vinous-red, weaker below; the head ash-grey, paler towards the forehead, and whitish on the chin; a black half-collar on the nape; the rump and upper tail-coverts dusky-ash; vent and lower tail-coverts white, the former tinged with ashy; middle tail-feathers ash-brown; the rest successively more broadly tipped with white, which spreads up the whole exterior web of the outermost feather, and their basal two-thirds (more or less) blackish; margin of the wing grey for the anterior half; the primaries and

* The "Jungle Pigeon" of Latham would seem to be merely a domestic variety of this kind.

their coverts dusky, and the secondaries greyish-dusky. Irides dark brown; bill black; and legs purplish-red. Length nine inches and a half; and of wing five and a quarter. Female rather smaller. The young nearly resemble the adults of *T. risorius*, except in their much smaller size, their general darker colour, especially upon the head, and in wholly wanting the vinaceous tinge: in this state of plumage, they doubtless constitute the supposed small race of *T. risorius*, mentioned by Major Franklin.

The Red Turtle-dove is generally diffused over the country, though much less numerously than the grey one. It also keeps more to cover, frequenting groves and high thick hedges. Its coo is short and grunt-like.

T. SENEGALENSIS: *Col. senegalensis*, Lin.: *C. cambaiensis*, Gmelin, *C. aegyptiaca*, Latham; *C. maculicollis*, Wagler:—figured, but not well, and much over-coloured, in Denon's Egypt. (*Tortroo Fachtah*, Hind.) (**NECKLACED TURTLE-DOVE.**) Brown above, the wing-coverts (except towards the scapularies) pure light grey; winglet, primaries and their coverts, dusky, the secondaries tinged with grey; head, upper-part of neck, and breast, pinkish-vinaceous, paling below, and passing to white on the belly and lower tail-coverts; the sides of the neck anteriorly (and meeting imperfectly in front,) adorned with a large patch of furcate feathers, black at base, with a round rufous spot on each tip: in the living bird, these hardly appear at all when the neck is drawn in; and unlike the preceding species, there is no bar or other marking on the nape: tail graduated to the depth of an inch, and its feathers attenuate a little towards their tips; the middle tail-feathers are brown; the rest white for the terminal half or nearly so, and black for the remainder. Irides dark with a white inner circle; bill blackish; and legs lake-red. Length ten inches or ten and a half, by fourteen inches; closed wing five inches.

This delicate little species abounds in most parts of the peninsula, also in Western and Upper India generally, and it inhabits the Rajmahal and Monghyr hills in Bengal; but in Lower Bengal, I have never seen or heard of it wild, nor does it appear to occur in the Himalaya, or in the countries to the eastward. In the peninsula, according to Mr. Jerdon, “it abounds both in low jungles, and near villages and cantonments, being found especially towards the north in every garden,

and frequenting stable-yards, houses, &c." Like *T. risorius*, it is common to India and North Africa; and Mr. Strickland states, that it "inhabits the Turkish burial-grounds at Smyrna and Constantinople, which are dense forests of cypress-trees. It is strictly protected by the Turks, and it was with some difficulty," he adds, "that I could obtain a specimen. It was perhaps originally introduced there by man; but now seems completely naturalized."* The coo of this species is low, subdued and musical, a dissyllabic sound repeated four or five times successively, and of which its Hindooostanee name *Tortroo* is a sort of imitation.

T. SURATENSIS : *Col. suratensis*, Gmelin, founded on *la Tourterelle de Surate* of Sonnerat : *C. tigrina*, Temminck : *C. turtur*, Lin., var., figured in Griffith's 'Animal Kingdom,' viii. 290. (*Chitroka Fachtah*, Hind.; *Chanral G'hoogoo*, or *Telia G'hoogoo*, Beng.; *Kangskiri*, Bhagul-pore; *Chitla*, Upper Provinces; *Lay-byouk*, Arracan.) (SPECKLED TURTLE-DOVE.) Above blackish or dusky; each feather having two pale rufous terminal spots, which latter enlarge, and spread up each side of the feather, upon the wing-coverts, the blackish contracting to a central streak, with broad pale vinaceous lateral borders; edge of the wing light grey; head greyish, tinged with vinaceous, which latter prevails on the breast and under-parts, passing to white on the belly and under tail-coverts; a broad half-collar on the nape, consisting of black feathers divergent at the tips, each tip ending in a small round white spot: tail broad and graduated to the depth of an inch and a half or more, each feather attenuating towards its tip; the middle tail-feather brown, the outermost greyish-white for nearly the terminal half, having the rest black, and the other tail-feathers successively intermediate in their colouring. Irides dark hazel, surrounded by a reddish *schlerotica*; beak dull leaden-black; and legs dark purplish-red. Length twelve inches by sixteen and a half; of wing five inches and three-quarters: female rather less.

A very familiar species, and generally diffused, both throughout India and in the Malay countries; coming very much into gardens, even of large towns. It abounds even more than *T. risorius*, in the vicinity of Cal-

* *Proc. Zool. Soc.* 1836, p. 100.

cutta, where it inhabits every patch of garden; *T. risorius* keeping generally a little away from houses. Its coo is musical and pleasing. Mr. Jerdon mentions having "seen a nearly albino variety once or twice, of a pinkish-white colour throughout." This species has been erroneously identified with the *T. chinensis* (*Col. chinensis*, Scopoli, vel *C. risoria*, var. B, Latham), founded on *la Touterelle grise de la Chine* of Sonnerat, by whom it is correctly figured. The latter is distinguished by its larger size, having the wing and tail respectively six inches long; by the deep ash-colour, instead of white, of its lower tail-coverts; and especially by having the back and wings plain unspotted dark brown, with merely a slight tinge of grey at the bend of the wing only; the spotting of the nape is precisely similar. This bird inhabits China, and the Society possess a specimen of it from Chusan.

T. MEENA: *Col. meena*, Sykes, *Proc. Zool. Soc.* 1830, p. 149: *C. agricola*, Tickell, *Journ. As. Soc.* II, 581; very closely allied to, if not identical with, *C. orientalis*, Lath., founded on *la Tourterelle brune de la Chine* of Sonnerat, which is certainly also *C. gelastis*, Temminck, *pl. col.* 550. (*Kullah Fachtah*, Hind.; *Sám G'hoogoo*, Beng.; *H'ulgah*, of the Mahrattas; *Gyo-pein-doo-ma*, Arracan.) (FOX-COLOURED TURTLE-DOVE). Vinaceous-brown, lighter on the belly; more or less ruddy, ashy, or even duskyish, above; the rump and upper tail-coverts deep grey; vent and lower tail-coverts lighter grey; crown and forehead more or less ashy, passing to whitish towards the bill; throat also whitish in some specimens; on the sides of the neck a patch of black feathers, margined with greyish-white, forming a series of three or four lines of the latter hue; scapularies, and a greater or less proportion of the wing-coverts, black, broadly margined with rufous all round their tips; coverts of the secondaries pale bluish-ash, at least in some specimens; winglet, and primaries with their coverts, dusky, the primaries slightly edged with whitish; tail dusky-ash, its outer feathers successively more broadly tipped with whitish-ash, whiter on the outermost and beneath; irides orange. Length about eleven inches and a half; of wing commonly seven inches.

This bird is also pretty generally diffused throughout India, and occurs upon the Himalaya as a summer visitant, arriving in pairs towards the end of March, as I am informed by Capt. Hutton. Mr. Jerdon

observed it to be tolerably abundant in the forests of Goomsoor, south of Cuttack, associating in flocks of various sizes. It is enumerated by Mr. Elliot, he adds, as found in the Southern Mahratta country; but was not observed by himself in the forest of Malabar. In the Himalaya, and in the eastern countries of Assam, Sylhet, and Arracan, it appears to be plentiful, inhabiting alike the hills and plains; and it is common in the Bengal Soonderbuns. A Javanese specimen is rather large, and very dull-coloured; less vinaceous underneath, with more grey on the head, and less rufous margining the feathers of its mantle, than in any Indian specimen I have seen; nevertheless, the species is probably identical.* It is nearly allied to *T. auritus*, Ray (*Col. tur-tur*, Lin.), of Europe, which it resembles in its manners, and in its coo: but is distinguished by its superior size; "orange irides instead of yellow; by the whole head (in some), neck, shoulders, breast and belly, being richer vinaceous; in the back and rump being ash, and vent and lower tail-coverts light cinereous," &c. The specimens of *T. auritus* from India and China, mentioned by Latham, may accordingly be presumed to have been of the present species. Another nearly allied dove would seem to exist in *la Tourterelle cendrée de l'Isle de Luçon* of Sonnerat, upon which are founded *Col. cinerea*, Scopoli, and *C. turtur*, var. C, of Latham. Living specimens of the present species, and of the Grey, Red, and Speckled, Turtle-doves, also of the Ground Dove, and of *Treron phænicoptera* and *Tr. bicincta*, are almost always to be seen for sale at the shops of the Calcutta bird-dealers.

Memorandum.—The only known Indian Pigeons now wanting to the Museum of the Asiatic Society, Calcutta, are *Columba Elphinstonii*, and Himalayan specimens of *C. palumbus*; also females of *Treron cantillans*, and of *Carpophaga insignis*; and good specimens of *Col. leuconota* are acceptable, as also of *C. pulchricollis*. Of species that require verification, there remain the *Treron pompadoura* of Ceylon, and *Psammænas Bur-nesii* of the Western Deserts (?). Also *Col. malabarica*, Lath. (*Colombe brame* of Temminck), founded on *la Tourterelle de la côte de Malabar* of Sonnerat. Size of *Turtur risorius*; head, back, and wing, pale ash-grey; the neck and breast weak vinous-grey; belly white; some oval

* This Javanese bird is certainly *T. orientalis*, (Lath.), and *gelastis*, (Tem.); the former of which names, holds precedence for the species.

black spots on the greater wing-coverts. Tail marked with white as in the other Turtle-doves. Bill, irides, and feet, red. Whether the Indian *Carpophagæ* ever lay more than a single egg in each nest, is also a subject for investigation.

April 4th, 1846.

E. B.

POSTSCRIPT.—Some notes on the Indian *Columbidæ*, with which I have been obligingly favoured by Capt. Tickell, arrived too late to be incorporated in the foregoing paper, but may nevertheless be advantageously appended to it.

“ *Treron phoenicoptera*. These birds are very common throughout the high stony barren parts of Singbboom, and in the Mautbboom district, confining themselves to the hurgoolur and peepul trees. They breed in the thick damp forests to the southward, towards Sumbulpoor, during the rains; at which time not a single specimen is to be found in these parts. The Ooriassell numbers of the young ones, which are taken to Calcutta.*

“ *Tr. bicincta*. I killed a specimen of this bird, some years ago, in Singbhooui, when firing into a flock of the Common Hurrial: and I have more than once remarked, in a flock of the latter, smaller individuals, which I have no doubt were interlopers of this species. It is exceedingly rare here, for I have never obtained another specimen.

“ *Tr. sphenus*. This bird, the *Kookoo-fo* of the Lepchas at Darjeeling, is there exceedingly common, but is not so extensively gregarious as the common Hurrial of the plains. They frequent the highest trees, feeding on their berries, and running along the branches with great agility. The male has a most agreeable note, exactly resembling the music of a pastoral reed or pipe. It breeds in June and July, making a large nest in high trees, deeper than that of the common Doves and Wood Pigeons. Bill, pale livid blue, nearly white at tip, and pale clear cobalt basally. The young resemble the female; and the ruddy tinge of the back and small wing-coverts of the male is not assumed until the second year.†

“ *Carpophaga insignis*. Of this fine species, I killed a female (one of a pair, the male of which escaped) at Kursiong, towards the end of the month of June. It is not common. The pair were perched on a small tree on the summit of the hill, feeding on berries, with which the crop of the female was filled. Voice, a deep short groan, repeated—‘ *woo-woo-woo*.’ Length of this female seventeen inches, by twenty-seven inches in spread of wing; wing nine inches. Irides pearl-grey: bill, dull lake, with blackish tip; legs dull lake. Back, scapularies, and wing-coverts, full deep vinous ash-grey washed with cupreous, the latter pervading the tips and edges of the feathers.

“ *C. sylvatica*. I have found these birds only in one part of my district,—in the jungles bordering on Midnapore. They were in a party of eight or ten, perching on detached trees, in a wide plain of jungle-grass. The notes are deep and ventriloquous.

* All that I have seen with the Calcutta dealers, were from the neighbourhood, and chiefly adults newly taken with bird-lime.

† I have observed this red to be less developed in some specimens; but still suspect that more or less of it would be obtained at the first moult.—E. B.

By the Oorias it is called *Sona Kubootra* [*i. e.* Golden Pigeon: it is also termed in some parts *Burra* (or great) *Hurrial*.]

“ *Chalcophaps indicus*. Common in the deep forests, always in the vicinity of streams; and generally upon the ground, in the shelter of beds of reeds and rank grass. When flushed, it takes a short but exceedingly rapid flight, alighting as abruptly with a sudden plunge into the herbage; so that it is a most difficult bird to shoot. Its favourite food consists of the seeds of the castor-oil plant.

Columba intermedia. Exceedingly common in Chota Nagpore, breeding in all the steep lofty rocks of that country.

“ *C. punicea*. Length sixteen inches, by two feet spread; wing eight inches and three-quarters. Bill greenish-yellow, with basal half livid. Iris amber-yellow, in an orange-red circle. Legs and feet dull lake. The female is similar to the male, but rather smaller and duller in plumage. This species is not uncommon to the south of Singbboom, going in small parties of four or five, and always along the banks of rivers, which are shaded by large forest-trees. Up and down these noble avenues, which the green shades of mingling boughs above, and the clear rippling stream below, preserve at all hours and seasons pleasantly cool; these Pigeons fly, rarely taking, when disturbed, to the more open tracts distant from the stream. In January 1842, I killed five specimens on the Bytarnee river in Singbboom. They were feeding principally on the jamoon. These birds feed chiefly in the morning and again at evening; and during the heat of the day, roost on the uppermost branches of the huge derris trees, common in that country. They are wary and difficult of approach.”

The above excellent contribution from Capt. Tickell, exemplifies exactly what I hope to be favoured with by many other correspondents — E. B. May 22nd, 1846.

A FOURTEENTH MEMOIR on the Law of Storms in India; being the Bay of Bengal, Ceylon, Malabar Coast, and Arabian Sea Storms of 29th November to 5th December, 1845. By HENRY PIDDINGTON, President of Marine Courts of Enquiry.

The Storms which are the subjects of this Memoir; are of very considerable interest, for taking their rise so near to the Equator as 7° North latitude, they travel up on the usual WN. Westerly track, crossing the Island of Ceylon, the Southern extremity of India and the Laccadive Archipelago, are finally lost for us, in the Arabian Sea, the last notice we have of them being that of the ship *Monarch*, which met hers in latitude 13 $\frac{1}{2}$ ° North, longitude 69° East.

This is the second instance of storms, which have been traced on the North side of the Equator, originating in so low a latitude, the first being

the *Fyzulbarry's*, detailed in my Eleventh Memoir, which had a track to the NNW., while these of our present Memoir have very distinctly one to the WNW. It will be remarked, that these storms appear to take their rise in about the same latitude North, as those in the *Storm tract*, to which I have elsewhere* alluded, do on the South side of the Equator, and about on the same meridian, but our information is, as yet, too scanty to allow us to draw any inference from this coincidence. A matter of more present importance, is, that it is a track which lies much in the way of our Steamers. It is partly on this account, and partly that I was desirous of recognising by early publication, the kind efforts of the Bombay Chamber of Commerce, which has transmitted to me, through the zealous labours of its Secretary, Mr. Scott, the documents from the West of Cape Comorin: while to Capt. Biden I as usual owe most of those on the East, that I have deferred other labours in hand to investigate it. I must not forget to acknowledge here also the attention of Capt. Twynham, Agent for the Peninsular and Oriental Steam Navigation Company; Capt. Moresby of their Steamer, the *Hindoostan*; Major General Cullen, Resident at Cochin; and Mr. Higgs, Master Attendant of H. M's. Naval Yard, Trincomallee, for their careful forwarding of all the information they could collect. We have also another novelty in this storm, which is, that of a fine, well appointed Steamer, (the Peninsular and Oriental Navigation Company's Steamer *Hindoostan*,) *steaming through the Western verge of the Vortex*, ! and passing the calm centre with all the changes of the wind, which she *should* have, and with the hurricane so violent as to blow away her boats, &c. I am much indebted to Capt. Moresby for his log observations and barometrical notes, which are of very great interest; for in the execution of his duty, he has also, like Capt. Finck of the *Charles Heddle*, performed a very valuable experiment for our new Science.

I have as usual given the authorities as closely abridged as possible, and finally omitting, for brevity's sake, the comparative table, the various considerations from which the track of the storm has been laid down. The documents begin with the log of the ship *Caledonia*, which had the storm farthest to the Eastward.

* *Horn Book of Storms*, p. 7, 2nd Edition.

Ship CALEDONIA, Captain BURN.

I have fortunately two abstracts of this ship's Log: fortunately, because in the one there is evidently some grave oversight as to the ship's place, which on the 29th, is made 49', and on the 30th, when she was becalmed at the centre of the hurricane, 68' miles! to the Eastward of the one now printed; which being in Capt. Burn's hand writing, I take to be the correct one. It has also the advantage of having the barometrical observations.

Extract from Ship CALEDONIA's Log Book; Bay of Bengal. Reduced to civil time. Forwarded by the Chamber of Commerce, Bombay.

Saturday, 29th November, 1845.—Throughout a moderate breeze, from Southward and SE. with passing squalls, and constant rain. Latitude by account 6° 50' North, longitude 88° 30' East; barometer 29.70; ship under double-reefed top-sails, and reefed courses, as the weather looked threatening. The two previous days we had much rain, and vivid lightning from the Northward and NW., and a heavy swell the last day from SW.

From noon till midnight, a fresh breeze from South and SSE., with heavy rain at times, swell increasing. Barometer 29.70. Distance run from noon to midnight ninety miles. Course West.

30th Nov.—1 A. M. Increasing breeze. Barometer 29.65.

,, 4 A. M. Heavy gale, wind shifting from South to SE. Barometer 29.50.

,, 6 A. M. Increasing gale, wind continually shifting from South to SE., and back again; a very heavy swell from SW. Barometer 29.50.

,, 7 A. M. Wind suddenly shifted to East, and increased to a very heavy gale, which obliged us to cut away the sails we had set, and lay the ship to, with her head to the Southward. Barometer 29.50.

,, 8-30 A. M. Gale at its height. Barometer 29.50.

,, 10 A. M. Gale decreasing, but found the barometer had fallen to 29.40.

30th Nov.—11 A. M. Suddenly fell calm.

- „ Noon. Light airs from SW. cloudy appearance all round.
- „ Barometer (still falling) 29.35, a very heavy swell.
- „ Latitude by account $7^{\circ} 0'$ North, longitude by account $85^{\circ} 50'$ East.
- „ From noon till 6 P. M. Light airs from the SW. and SSW., with cloudy weather and a heavy swell. Barometer gradually falling.
- „ 6-30 P. M. Increasing breeze from the South. Barometer 29.25.
- „ 7-30 P. M. Gale returned with all its former violence, a very heavy swell from SW. Barometer 29.20.
- „ 10-30 P. M. Barometer commenced rising. Wind South.

1st Dec.—1 A. M. Gale decreasing. Barometer 29.40.

- „ 4 A. M. Gale moderating fast, and swell going down, wind drawing round from South to SE. Barometer 29.45.
- „ 8 A. M. Fresh breeze, a SE. Barometer 29.60.
- „ Noon moderate, breeze ESE., with cloudy weather. No observation.

The following day we got observations, and found the longitude by account correct to a few miles, but the latitude by account was fifty miles to the Southward of observation, shewing we had experienced a strong set to the Northward.

JOHN F. BURN,

Bombay ; 9th February, 1846.

Commander, Ship Caledonia.

Abridged Log of the Ship ALIBI, Captain RHODES, from the Mauritius, bound to Vizagapatam. Log reduced to civil time.

On the 27th November.—The *Alibi* was at noon in latitude $3^{\circ} 6'$ North, longitude $90^{\circ} 34'$ East, with a five knot breeze from the South.

Throughout the 28th.—To noon on that day ; when she was in latitude $6^{\circ} 9'$ North, longitude $90^{\circ} 57'$ East. She had strong steady South to SSE., winds, latterly the weather rather unsettled, but at noon she had a lower studding-sail set. P. M. the wind hauling gradually to the

Eastward, and at 6 p. m. it was due East to midnight. Ship running eight knots to the Northward.

29th November.—Wind EbN., and ship running to the North, seven and a half knots, to noon; when latitude by observation $9^{\circ} 8'$ North, longitude $91^{\circ} 0'$ East, frequent squalls, and the weather very unsettled. Barometer at 29.45. p. m. hard squalls and sea rising. 6 p. m. wind ENE., at 9, South, and decreasing, but the squalls heavier. Ship always running seven and eight knots to the NNW.

30th.—Midnight and to noon, wind marked NE., increasing again with tremendous heavy squalls, and weather very threatening. At daylight more moderate, and at noon latitude $11^{\circ} 50'$ North, longitude $89^{\circ} 32'$ East. Barometer rising a little, and weather clear to the East, but dark and heavy to the Westward. p. m. and to noon on the 1st, strong NE. breezes.

It will be clearly seen on reference to the chart, that this ship ran up between the 28th and 29th to the Eastward of the Caledonia's Storm Circle, which was probably then forming.

Abridged Log of the Ship JULIANA, Captain W. T. Woodhouse, from the Mauritius to Madras. Reduced to civil time. Forwarded by Capt. BIDÉN.

The *Juliana* at noon on the 27th November, was in latitude $5^{\circ} 9'$ North, longitude $87^{\circ} 50'$ East, with fresh breezes N. Westerly, threatening weather and thick misty rain, with a high confused sea from ENE. p. m. to midnight, wind N. Westerly to West, with the same weather, and a broken swell from the NE. At 10, wind varying from NNW. to West. Heavy rain all night.

28th November.—Daylight wind had veered to SW., noon moderate with passing showers. Latitude $7^{\circ} 12'$ North, longitude $89^{\circ} 3'$ East. p. m. to midnight, gradually increasing to fresh gales; and rain and wind veering from SW. to SSE. at 8 p. m.; at 9 SE., at 10, East; at 12, ENE.

29th.—At 1 a. m. wind NEbE. At daylight "increasing gales." At 8 a. m. NNE. and increasing to noon, when strong gales NNE. and a heavy sea, latitude $8^{\circ} 54'$ North, longitude $87^{\circ} 28'$ E.* At 11 a. m. hove to. p. m. to midnight, gale from NE. with some very heavy gusts, the strongest at 4 p. m. Sea very heavy.

* *Hawks, Petrels and other birds alighting*, is noted in the log at noon this day.

30th November.—2 a. m. wind ENE. 8 a. m. ESE. Noon latitude 9° 34' North, longitude 86° 5' East. p. m. moderating. 3 p. m. wind East, at 9 ENE. to midnight, when gale breaking to windward with dark appearance to the SW. and vivid lightning.

1st December.—Moderating. Noon latitude 10° 53' North, longitude 84° 53' East.

This Ship's barometer was deranged.

Abridged Note from the Log of the Ship FRANCES, Captain SHARP, from England (?) to Madras. Reduced to civil time. Forwarded by Captain BIDEN.

30th November, 1845.—Strong gale with heavy squalls and a high head sea, ship under three double-reefed top-sails, and fore-topmast stay-sail. Wind from WNW. to SW. Latitude by account 7° 42' North, longitude by account 86° 9' East. p. m. a heavy gale, and a dangerous head sea from North-eastward. p. m. carried away the fore and main-topgallant masts.

1st December.—Strong breeze and cloudy, latitude by account 9° 13' North, longitude by account 85° 41' East. p. m. more moderate throughout, with rain.

2nd.—Latitude by observation 11° 39' North, longitude by observation 85° 50' 15" East.

Extract from the Log Book of the Ship MORLEY. Forwarded by Captain BIDEN,

At noon 30th November, then in latitude 9° 50' North, longitude 87° 10' East, with brisk gales from SSW. The glass commenced to fall, a wild appearance, down royal-yards and all the gear. At 8 p. m. a sudden shift in a tremendous squall from East. At midnight, a severe storm attended with strong gusts, the sea making up in heaps, causing the ship to lurch heavily and endangering the masts. At 8 a. m. 1st December, a heavy storm, wind veering from NNE. to East with heavy rain, ship now lying to under close-reefed main- topsail. Noon a heavy

gale EbN. at midnight, the gale veered to ESE. and became more moderate. Glass down in the height of the gale to 28.90.

The following Memorandum of the MORLEY's Barometer, was obtained and forwarded to me, by Captain BIDEN.

| | |
|--|-------|
| Morley's Barometer at commencement of gale, .. | 29.85 |
| Ditto midnight, 30th November, | 29.30 |
| Ditto ditto, 1st and 2d December, 3 A. M. | 28.90 |
| Soon after the strength of the gale, Barometer rose to, .. | 29.40 |
| and suddenly to, | 29.80 |

Ship MYARAM DYARAM.

Capt. Biden, notes in a letter, that the ship *Myaram Dyaram*, from Manilla to Bombay, put into Galle, having lost boats, cut away anchors, and thrown part of her cargo overboard, in a gale from the Eastward in 9° North and 86° East, and this appears, by a letter from Capt. Faucon of the *Frolic*, to the Secretary of the Bombay Chamber, to have occurred on the 1st December. This vessel is also noticed in a letter from Capt. Twynham, at Point de Galle, as having had the gale *at the same time* as the *Caledonia*, and five feet water in her hold.* We are thus uncertain as to the date of the worst part of the storm with her. Capt. Faucon states it to have begun on the 28th; the two ships, the *Caledonia* and *Myaram* having left the Straits together.

Abridged Log of the Ship JOHN WICKLIFFE, from London to Madras.
Reduced to civil time. Forwarded by Capt. BIDEN.

On the 29th November.—From noon to midnight, the *John Wickliffe* was running up to the NbE. with a fresh WNW. to Westerly breeze, going from five to eight knots, *with a heavy head sea.*

* The Captain promised a copy of the log to Capt. Twynham, but left without giving it. Had we not a hundred instances of the kind, we could not believe that, after passing through such peril and loss, men will not take the trouble of desiring any boy or junior officer on board, to copy three days' logs! for those who are trying to teach them how to avoid such misfortunes in future.

On the 30th November.—Midnight to noon, the wind is marked between West and NW. and gradually decreasing to two and a half knots. Noon latitude $5^{\circ} 43'$ North, longitude $86^{\circ} 15'$ East, with a heavy head sea. P. M. wind West to WSW., at 5, NW., at 7, NEbN., and at 8, calms and variable, till at 9, a light breeze sprung up from the South, veering a little to the West. At midnight, ship going four knots.

On the 1st December.—Fine Southerly and SS. Easterly breeze to noon, when barometer marked 29.80, latitude $7^{\circ} 9'$ North, longitude $85^{\circ} 42'$ East. The same breeze with cloudy weather to midnight.

Ship WILLIAM ABRAM's Note from Capt. BIDEN.

The Ship *William Abram*, on the 30th November in latitude $4^{\circ} 36'$ North, and longitude $90^{\circ} 10'$ East, thermometer at 80° , and sympiesometer at 29.65, had the wind from noon on the 29th, in light squalls from the NW. and at midnight and towards noon on the 30th, variable from the South, with squalls and heavy rain.

Peninsular and Oriental Steam Navigation Company's Ship HINDOOSTAN.

Capt. MORESBY. From Point de Galle, bound to Madras.

I am indebted to Capt. Moresby for this very interesting log, which as it details a new experiment of high interest to us, that of a fine, well appointed and ably commanded Steam Ship, steaming through the centre of a hurricane, I have printed at length.

Log of the Peninsular and Oriental Steam Navigation Company's Steam Ship HINDOOSTAN. From Point de Galle towards Madras.

| H. | Courses. | K. | F. | Winds, &c. | Bar. | Remarks, Monday, Dec. 1st, 1845. |
|----|----------|----|----|------------|-------|---|
| 1 | NE. | 7 | 4 | NNW. | .. | A. M. Fresh breeze and cloudy. |
| 2 | .. | 7 | 4 | .. | .. | At 2, Sounded, 6 fathoms. At 2, |
| 3 | NNE. | 7 | 4 | | | latitude by Canopus $6^{\circ} 27'$ North. At |
| 4 | NbW. | 7 | 4 | | | 4, sounded in 60 fathoms, no ground. |
| 5 | .. | 7 | 4 | | | At 5-30, saw the land to the NW. |
| 6 | ENE. | 7 | 4 | | | At 6, saw the Basses right a head, distant |
| 7 | NNE. | 7 | 4 | | | about 2 miles, hauled out to ENE. At |
| 8 | .. | 7 | 4 | | | 6-20, sounded, no bottom at 70 fathoms |
| 9 | .. | 7 | 4 | | | when Saddle hill bore NNW., Chimney |
| 10 | .. | 7 | 4 | | | hill NW $\frac{1}{2}$ W. and the middle of the |
| 11 | NbE. | 7 | 4 | { Ther. | 29.71 | Basses NbW. At 8, cloudy weather; visited ship—squally appearances. At |
| 12 | .. | 7 | 4 | | 76° | 11, hard rain; noon hard squall of wind and rain, with thick uncomfortable weather. Found we have experienced a current of 46 miles against us. |

Distance Steamed. Longitude Chronometer. Latitude Observation.

| Various courses, 140 miles. | | | 82° 10' East. | | 6° 50' North. |
|-----------------------------|--------|---|---------------|-------------------------------|---------------|
| 1 | Nb E. | 7 | .. | North. | Bar. |
| 2 | .. | 7 | .. | .. | 29.69 |
| 3 | North. | 7 | .. | | |
| 4 | .. | 7 | .. | | |
| 5 | Nb E. | 7 | .. | | |
| 6 | .. | 6 | .. | .. | 29.64 |
| 7 | .. | 6 | .. | .. | 29.60 |
| 8 | .. | 5 | .. | .. | 29.50 |
| 9 | N NE. | 5 | .. | North. | 29.00 |
| 10 | NE. | 5 | .. | .. | 29.00 |
| 11 | .. | 3 | .. | .. | 28.90 |
| 12 | NNE. | 3 | .. | { N. E. } mid- night. { | 28.90 |

| H. | Courses. | K. | F. | Winds, &c. | Bar. | Remarks, Tuesday, Dec. 2nd, 1845. |
|----|----------|----|----|--------------------|-------|-----------------------------------|
| 1 | East. | 3 | .. | East. | 28.90 | |
| 2 | North. | 5 | .. | SW. to S. | 28.90 | |
| 3 | East. | 2 | .. | { SW. to SSE. } | 29.00 | |
| 4 | North. | 5 | .. | .. | 29.25 | |
| 5 | Nb W. | 6 | .. | SE. | 29.40 | |
| 6 | .. | 6 | .. | .. | 29.54 | |
| 7 | .. | 6 | 4 | .. | 29.61 | |
| 8 | .. | 6 | 4 | .. | 29.62 | |
| 9 | .. | 7 | .. | .. | 29.62 | |
| 10 | NNW. | 7 | .. | ESE. | 29.62 | |
| 11 | .. | 7 | 4 | .. | 29.64 | |
| 12 | .. | 7 | 4 | .. | 29.64 | |

Distance Steamed. Longitude. Well at 2 A. M. 3 inches. Lat. Observation.

Various 140 miles. Long. by act. 82° 20' East. No observation Lat. by act. 8° 41' N.

| | | | | | | |
|----|----------------------------------|---|----|-------|-------|---|
| 1 | { NNW. } { $\frac{1}{2}$ W. } | 8 | .. | SE. | 29.74 | At 2, the chocks of the fore yard |
| 2 | .. | 8 | .. | | | carried away, secured the yard with |
| 3 | .. | 8 | 4 | | | fresh lashing. At 4, strong gale with a |
| 4 | .. | 8 | 4 | | | heavy following sea, wind veering from |
| 5 | .. | 8 | 4 | East. | 29.80 | South to SE. Carpenters with seamen |
| 6 | .. | 8 | 4 | .. | | securing and nailing the skylights, &c. |
| 7 | NNW. | 8 | 4 | | | At daylight got the starboard cutter in |
| 8 | .. | 8 | 4 | | | board and secured, she is almost knock- |
| 9 | .. | 8 | 4 | | | ed to pieces. At 8, moderating. At 9, |
| 10 | .. | 8 | 4 | | | squally, noon squally with rain. Car- |
| 11 | .. | 8 | 4 | | | penters fitting dead-lights, opening |
| 12 | .. | 8 | 4 | SE. | 29.80 | ports, &c. At 4, strong breeze and |
| | | | | | | cloudy rain. At 8, squally from NE. |
| | | | | | | visited ship and found all right. Mid- |
| | | | | | | night, wind variable from the SE. |

| H. | Courses. | K. | F. | Winds, &c. | | Remarks, Wednesday, Dec. 3rd, 1845. |
|----|----------|----|----|------------|-------|--|
| 1 | NNW. | 8 | 4 | NE to SE | Well. | A. M. Moderate, wind with a heavy S.E. swell. |
| 2 | .. | 8 | 4 | .. | .. | At 2, lat. by Canopus $10^{\circ} 25'$ North. |
| 3 | .. | 8 | 4 | .. | Dry. | At 2, ditto, Sirins, $10^{\circ} 24'$ North. |
| 4 | .. | 8 | 4 | .. | .. | Daylight thick hazy weather. At 8, moderate weather. |
| 5 | .. | 8 | 4 | East. | .. | |
| 6 | .. | 8 | 4 | .. | Dry. | |
| 7 | .. | 8 | 4 | .. | .. | |
| 8 | .. | 8 | 4 | .. | Dry. | |
| 9 | .. | 8 | 4 | .. | .. | |
| 10 | .. | 8 | 4 | ESE. | .. | |
| 11 | .. | 8 | 4 | .. | .. | |
| 12 | .. | 8 | 4 | .. | .. | |

Captain Moresby remarks in a letter to me, that "during the first part of the hurricane, the atmosphere felt very close and warm."

Ship FRANCES.

Captain Biden has furnished me with an extract from the log of the ship Frances, from Colombo to Madras, which vessel was on the 29th November, in $6^{\circ} 4'$ North, and on the 2nd December in $11^{\circ} 39'$, but has no intervening observations or latitude by account given. She was probably, Capt. Biden says, about sixty miles from the Ceylon shore. She evidently ran up just before the storm reached that meridian, having had strong S.E. and Easterly gales on the 1st and 2nd.

Ship CARNATIC, bound to Bombay. From the Bombay Chamber of Commerce.

This ship was standing in to sight Cape Comorin, and at noon on the 1st December was in latitude $4^{\circ} 25'$ North, longitude by chronometer $78^{\circ} 43'$ East, her barometer 29.70, sympiesometer 29.50, and thermometer 84° , with a moderate breeze from the North, cloudy, light rain, and a heavy head swell. By midnight the wind had veered to the Westward, (I suppose about NW.?)

2nd December.—Daylight increasing North Westerly breeze, latitude at noon $5^{\circ} 21'$ North, longitude $79^{\circ} 33'$ East, barometer 29.66, sympiesometer 29.16, thermometer 81° . r. m. Fresh breeze from the Westward, and unsettled weather with a confused sea. At 8 r. m. to midnight. The same wind at SW.

At noon on the 3d.—Latitude 6° 46' North, longitude 78° 29' East, barometer 29.80, spyiesometer 29.20, thermometer 84°.

Ship BOLTON, Capt. T. DAVIDSON. From the Bombay Chamber of Commerce.

This ship was also like the *Carnatic*, standing in to sight Cape Comorin, and the abstract from her log is given in a tabular form, which I print below. It appears that like the *Carnatic*, she just felt the South-western quadrant of the storm, which was wrecking the *Florist* at Tunicoreen in its passage over the Peninsula.

Extract from the Log of the Ship BOLTON.

| Dates. | Latitude. | Longitude. | Barometer. | Thermome- ter. | Wind. | Remarks. |
|----------|-----------|------------|------------|-------------------|-----------|---|
| 1st Dec. | 4° 40' N. | 77° 37' E. | 29.90 | 83 | NNE. | Fresh winds and cloudy. Ship 43 miles West of account. |
| 2nd ,, | 5° 50 | 77° 24 | 29.80 | 84 | W. to NW. | First part light airs, lat- ter part heavy squalls of wind and rain, weather very unsettled. |
| 3rd ,, | 7° 17 | 77° 10 | 29.60 | 83 | W. to N. | First severe squalls with torrents of rain, lat- ter part calm. |
| 4th ,, | 7° 8 | 77° 42 | 29.80 | 82 | Calms. | Found the current to have set these last 24 hours S. 50° E., 42 miles. |

Ceylon and the Southern part of the Peninsula of India.

We now take the data which relate to the passage of the storm over Ceylon and the Southern extremity of India. These are mostly but detached notes, but will enable us to trace the vortex pretty accurately; as to time at least, to the Malabar Coast. It will be recollected that we had the log of the *Hindoostan* Steamer off the Eastern Coast of Ceylon, steaming through the Eastern verge of the centre, a little after midnight of the 1st and 2nd, being then about thirty miles from the shore, and to the ESE. of Baticolo.

Captain BIDEN, Master Attendant of Madras, says:—

“ The Master of the War Steamer *Spiteful* says, it blew hard at Trincomallee on the 1st, from East and SE. Several trees were blown

down, but the fury of the gale was to the Southward, and what is very remarkable, is, that although the strength of the hurricane was about the *Hindoostan's* position, yet a vessel arrived at Trincomallee that was off the Basses on the 1st, and she was perfectly becalmed, yet the Ceylon paper states, that it blew hard at Point de Galle. The Master could not tell me the range of the *Spiteful's* barometer. However, the reports I send you, shew that this gale extended from several degrees East of Ceylon, across that Island to Tuticoreen, Tinevelly, and Ootacamund on the Neilgherries, and to Quilon on the Malabar Coast, where I suspect it was confined within a narrow compass, in a North and South direction. It was squally off Calicut, but was scarcely felt at Tellicherry. The H. C. Sloop of War *Coote*, struck on the reef off Calicut on the 1st, and the foul weather on the 3rd broke her up.

" We were apprehensive of bad weather here, as the surf was high with a turbulent sea, heavy clouds all gathering in the SE. and as a ship came in from the Northward on the 2nd and experienced very fine weather, and our Steamer the *Hindoostan* had not arrived, I was clearly of opinion, that she had encountered a gale to the Southward, and so it proved to be the case. We had very threatening weather on the 16th, I prepared the shipping by signal to " prepare to slip and put to sea." Barometer fell from 30° to $29^{\circ} 88'$, however, although the clouds portended wind and rain, we had but little of either. On the 25th and 26th, barometer ranging from $30^{\circ} 10'$ to $30^{\circ} 18'$, we had the heaviest fall of rain we have experienced this year, and serious alarms are happily relieved by that providential downfall, but how are we to account for such a dense atmosphere, and so much rain, without the mercury indicating so great a change? The sympiesometer also rose a day or two before, and continued steady—there was but little wind throughout, the weather was close and the thermometer higher than usual at this season, viz. from 78° to 82° .

" A large ship under jury masts was seen off Trincomallee on the 19th instant. Capt. Maitland steamed out of the harbour at daylight, on the following day intending to offer assistance, but the stranger was out of sight, and the *Spiteful* having but few coals, and *none in store at Trincomallee!* Capt. Maitland was reluctantly compelled to put back. The ship *Robert Small*, homeward bound, sailed from these roads on Saturday evening the 29th, and must I think, have run right into the

heart of the gale, as she started with a fresh NE. wind. However, she is ably commanded and well managed."

Capt. BIDEN in an additional note adds—“Capt. Maitland, H. M. Steam Vessel *Spiteful*, reports that the gale was severe at Trineomallee on the 1st instant, and that a complete hurricane raged at Baticolo and to the Southward. Ceylon papers of the 13th instant, report, that the gale though brief, was very severe at Point de Galle on the night of the 1st, and during the 2nd instant.

“The ship *Caledonia* from Singapore to Bombay, has also put in at Galle, having lost top-gallant masts, top-sails and fore-sail, and quarter boats, and thrown part of her cargo overboard, in a heavy gale from South, SE. and East, on the 30th ultimo, in latitude 7° North, and longitude 88° East.

“At Tutieoreen the ship *Florist*, loading for China, was wrecked on the night of the 2nd instant, on a reef off Tutieoreen.

“The gale was violent at Quilon on the night of the 2nd instant, and at A. M. of the 3rd instant several *Dhonies* were driven on shore, and beat to pieces. The *Charles Forbes* encountered the gale off Anjengo, and the time verified by her log may be considered as more correct than that which is reported from Quilon.

“The hurricane raged with great violence at Tinevelly and at Otaeamund, but I have not been able to obtain the ranges of the barometer.”

C. BIDEN.

From Mr. HIGGS, Master Attendant of Trincomallee.

I have the following register of the weather from the 30th November to the 3rd December, but have altered the letters which designate the weather to words, as the former are not generally understood.

Mr. Higgs, says in his letter to me, “during the night of the 1st and morning of the 2nd instant from Trincomallee on the road to Kandy in a SE. direction, a vast number of large trees were blown down so as to obstruct the road, and at Habboneme, fifty miles distant, the travellers’ bungalow was blown down; there has not been a settled gale of wind at Trineomallee for the last eleven years, but we have frequently had in the months of November and December, a heavy swell rolling in from the NE. when there have been gales in the Bay of Bengal.

| H. | H. | Winds. | | | 30th November, 1845. | | |
|----|---|--------------|----------|-----------|----------------------|---------------|-------------------------------|
| 2 | Barometer in Inches and De- cimals. | Thermometer. | Quarter. | Strength. | Weather. | Rain. Inches. | Remarks. |
| 4 | | | | | | | |
| 6 | 29.79 | 78 | N.E. | 5 | .. | .. | Cloudy and blue sky. |
| 8 | 29.80 | 81 | .. | 5 | .. | .. | Overcast and squally. |
| 10 | 29.82 | 79 | NNE. | 5 | .. | .. | Cloudy and blue sky. |
| 12 | 29.82 | 82 | N.E. | 5 | .. | .. | A high sea from the Eastward. |
| 2 | 29.76 | 82 | .. | 5 | .. | .. | Overcast. |
| 4 | 29.76 | 81 | .. | 5 | .. | .. | |
| 6 | 29.76 | 80 | .. | 5 | .. | .. | |
| 8 | | | | | | | |
| 10 | | | | | | | |
| 12 | | | | | | | |

| H. | H. | Winds. | | | 1st December, 1845. | | |
|----|---|--------------|----------|-----------|---------------------|---------------|---|
| 2 | Barometer in Inches and De- cimals. | Thermometer. | Quarter. | Strength. | Weather. | Rain. Inches. | Remarks. |
| 2 | .. | .. | N.E. | 6 | .. | .. | Overcast and squally. |
| 4 | .. | .. | .. | 6 | .. | .. | |
| 6 | 29.76 | 76 | .. | 7 | .. | .. | A very high sea in the offing (from East.) |
| 8 | 29.76 | 77 | .. | 5 | .. | .. | Rain in showers. |
| 10 | 29.78 | 77 | .. | 5 | .. | .. | |
| 12 | 29.74 | 79 | .. | 5 | .. | .. | Blue sky and cloudy. |
| 2 | 29.70 | 78 | NEbN. | 6 | .. | .. | |
| 3 | 29.68 | 76 | .. | 7 | .. | .. | Violent gusts with rain. |
| 4 | 29.68 | 76 | NE. | 6 | .. | .. | Rain. |
| 6 | 29.68 | 76 | .. | 6 | .. | .. | |
| 8 | 29.68 | 76 | .. | 6 | .. | .. | |
| 10 | 29.68 | 76 | ENE. | 6 | .. | .. | |
| 12 | | | | | | | |

Baticolo and Tuticoreen.

From the *Colombo Observer* of the 15th and 18th, I collect the following notices of the storm at the above named places, the notice of the 18th is a well written letter, evidently by a careful observer at Baticolo, and I have used the other notices only to supply a few words.

*Batticaloa.**—This place was visited by a most fearful hurricane on the night of the 1st instant. The day had been very wet and stormy with squalls from the NE., but this was considered as no more than the usual monsoon. However, about midnight, it began to blow with great fury from the NW., or along the coast, with heavy rain. About half-past 2 A. M. of the 2nd, the wind shifted round to the opposite quarter, and after a short but ominous lull, blew with truly terrific violence from the South and SE., occasioning wide spread, and almost universal, destruction of trees and native houses, and even of bungalows. The roaring and hollow *moaning*† (as noticed by many) of the hurricane, the incessant dash of the rain, and a complication of other noises, were most dismal, but in fact even the crash of thousands of falling trees could not be distinctly *heard*, though it must have added to the general uproar. No body could say if it thundered, *but a great light* was observed at one period of the storm, which probably was caused by some electric explosion. The hurricane did not extend to the country at the most Southern extremity of the lake of Batticaloa.

Tuticoreen.—The effects of the gale are thus described in a letter dated the 4th instant (December.) The gale commenced about 8 P. M. (the date is not given, but in the paper of the 15th, the *Florist* is said to have been lost on the night of the 2nd,) and raged with unremitting fury till 3 A. M., after which it abated, and about sunrise there was a comparative calm. The wind was from SE. accompanied with torrents of rain. During the night the ship *Florist*, of 538 tons, was driven on shore.

For the following observations from Palamcottah, Cochin, Trevandrum, Quilon and Alleppy, I am indebted to Major General Cullen.

* This is no doubt the correct spelling, but Horsburgh, and all the charts use Baticolo, which I have therefore preferred.

† I have noticed this before (VIIth and XIth Memoirs, and Horn Book of Storms,) there is no doubt that it does occur in hurricanes very frequently. Is it an electric phenomenon, analogous to the remarkable rumbling which precedes a hail storm in India, and often in Europe?

Meteorological Observations at Palamcottah. By Conductor THOMAS DARLING of the Ordnance.

| 1845. | Hour. | Thermometer. | Hour. | Barometer. | Thermometer. | | | Fall of Rain. | Remarks. |
|------------------|---------|--------------|------------------|------------------|------------------------|-----------|------------------|---------------|--|
| | | | | | Maxim ^{um} B. | Attached. | Wet Bulb. | | |
| <i>December,</i> | | | | | | | | | |
| 1 | 9 A. M. | 29.916 | 79 $\frac{1}{2}$ | 71 | 4 P. M. | 29.796 | 85 $\frac{1}{2}$ | 73 | .. |
| " | 2 | .. | 880 | 78 | 79 | 71 | .. | .. | Dark haze with a slight drizzling rain now and then during the day. Wind blowing fresh from N.E., at 4 P. M., with heavy rain. At 11 P. M. A violent gale from the East, by which all the oldest and largest trees were uprooted and laid prostrate. At Midnight. Very violent, the wind veering to the S.E. accompanied with heavy rain until about 1 $\frac{1}{2}$ A. M., when the hurricane abated. 6 A. M. Clear and fair, with a fresh breeze from the S.E. |
| " | 3 | .. | 866 | 79 $\frac{1}{2}$ | 78 | 75 | " | 800 | 85 |
| " | 4 | .. | 954 | 80 | 79 | 75 | " | 842 | 85 |
| " | 5 | .. | 874 | 80 $\frac{1}{2}$ | 78 | 75 | " | 764 | 85 |
| | | | | | | | | 76 | .. |
| | | | | | | | | | Clear : wind fresh from Southward, evening. |
| | | | | | | | | | Clear : wind, light, cool N. wind : evening fresh from S.E. |

Register of the Barometer at Cochin, during the Gale of the 3rd December, 1845.

| Date. | Time. | Bar. | Ther. | Dew point by Daniell. | Remarks. |
|---------|-----------------------|--------|------------------|-----------------------|--|
| 1845. | | | | o | |
| Nov. 29 | 9 $\frac{1}{2}$ A. M. | 30.232 | 81 | 61 | |
| " 30 | 9 $\frac{1}{2}$ " | .190 | 81 $\frac{1}{2}$ | 65 | |
| Dec. 1 | 9 $\frac{1}{2}$ " | .200 | 80 $\frac{1}{2}$ | 64 | Generally dry Easterly winds, as shewn by the dew point. |
| " 2 | 9 $\frac{1}{2}$ " | .144 | 81 | 67 | |
| " " | 4 $\frac{1}{2}$ " | .050 | 81 $\frac{1}{2}$ | 67 | |
| " 3 | 6 $\frac{1}{2}$ " | 29.980 | 77 | X | |
| " " | 6 $\frac{1}{2}$ " | .964 | 76 | 72 | |
| " " | 7 | .980 | 76 | X | |
| " " | 7 $\frac{1}{2}$ " | 30.000 | 77 | X | |
| " " | 7 $\frac{1}{2}$ " | .012 | 77 | X | |
| " " | 7 $\frac{3}{4}$ " | .026 | 77 | X | |
| " " | 8 $\frac{1}{2}$ " | .050 | 77 | X | |
| " " | 8 $\frac{1}{2}$ " | .058 | 77 | X | |
| " " | 8 $\frac{1}{2}$ " | .070 | 77 | X | |
| " " | 8 $\frac{3}{4}$ " | .114 | 77 | X | |
| " " | 9 | .130 | 77 | 74 | |
| " " | 9 $\frac{1}{2}$ " | .142 | 77 | X | |
| " " | 10 | .154 | 77 | X | |
| " " | 10 $\frac{1}{2}$ " | .158 | 77 | X | |
| " " | 11 | .160 | 78 | X | Moderate breeze SSE. |
| " " | 12 | .160 | 79 | X | |
| " " | 1 P. M. | 30.164 | 79 | X | Ditto ditto Southerly and SWesterly. |
| " " | 2 $\frac{1}{2}$ " | .130 | 79 | X | |
| " " | 4 | .130 | 79 | 74 | Ditto ditto Southerly and SWesterly. |
| " 4 | 9 $\frac{1}{2}$ A. M. | .286 | 81 | 68 | |
| " 5 | " | .218 | 82 | 70 | |
| " 6 | 9 $\frac{1}{2}$ A. M. | .170 | 80 | 73 | |
| " 7 | " | .224 | 82 | 76 | |

About one inch of rain fell from midnight on the 2nd to noon on the 3rd.

Barometer at Trevandrum.

| Date. | Time. | Bar. | Ther. | Remarks. |
|--------------|-----------------------|--------|------------------|-----------------------|
| 1845. | | | o | |
| November, 29 | 9 $\frac{1}{2}$ A. M. | 29.930 | 82 | |
| " 30 | " | .864 | 82 | Three inches of rain. |
| December, 1 | " | .844 | 81 $\frac{1}{2}$ | |
| " 2 | " | .960 | 82 | |
| " 3 | " | .990 | 80 | |
| " 4 | " | .928 | 83 | |
| " 5 | " | .854 | 81 | |
| " 6 | " | .822 | 81 $\frac{1}{2}$ | |
| " 7 | " | .874 | 82 | |

At Trevandrum.—It appears to have blown very strong, at 1 A. M. of the 3rd a violent gale from 2 $\frac{1}{2}$ to 3 : abated from 3 to 3 $\frac{1}{2}$: when it recommenced with greater violence, than ever, and continued till about day-break.

At Quilon.—The Master Attendant writes that—“The gale commenced at 10 p. m. of the 2nd, and continued till 7 a. m. of the 3rd.”

At Alleppy.—The Master Attendant writes—“A gale of wind with some rain commenced at this place about midnight on the 2nd, which continued till daylight on the 3rd, when it blew a perfect hurricane.”

At Cannanore.—A correspondent writes—“The gale on the 3rd commenced here as far as I can remember, about 8 a. m., and lasted till about 1 p. m. At first from NE. and East, and latterly from SE. and SSW. Hardly any rain fell.”

Remarks on board the Ship FAIZE ROHABANNY, THOMAS STEWART, Commander. From the Bombay Chamber of Commerce. Reduced to civil time.

December 2nd.—Light SE. breezes and cloudy.—Midnight. Squally; wind veered to the Eastward, in twenty-six fathoms off Cadiapatam Point. Barometer 29.95.—p. m. Wind WNW., a fresh breeze, and cloudy, with constant rain.—Sunset. Barometer 29.80: dark cloudy weather: wind increasing to a gale.—At 9 p. m. Barometer 29.70: strong gale from the SW.: a high confused sea: lying to under close-reefed main-topsail: thirty-three to thirty-five fathoms.—Midnight. Violent squalls from the Westward with heavy rain, lightning from the Eastward. Barometer 29.50.

3rd.—At 3 a. m. Barometer 29.45: the wind veered round to the Southward.—Noon. Calm and sultry weather: off Cape Comorin: twenty-nine fathoms. Barometer 30.5.—p. m. Wind NNE.: light breeze and clear weather.

4th.—Noon. Cape Comorin NE.: after which fine weather.

Abstract of the Log of the Ship CHARLES FORBES, Captain WILLS; from China bound to Bombay. Civil time. From the Bombay Chamber of Commerce.

December 1st 1845.—a. m. Light Northerly and NNEasterly airs and hazy weather.—Noon. Winds ENEasterly: Latitude 7° 52' North:

forty-six fathoms water.—P. M. Winds light and veering to the Southward and South-westward.—Midnight. Light NWesterly winds and fine weather.

2nd.—A. M. Light Northerly and NEasterly winds and fine weather.—Noon. Winds variable and light: Latitude 8° 48' North: twenty-six fathoms.—P. M. Calms with occasional light variable airs.—Sunset. Wind NW. and increasing; the weather very unsettled; heavy clouds hanging over the land with lightning.—At 8. Light breeze and cloudy, with rain; tacked off shore.—At 9. Increasing breeze with squalls: Barometer 29.80: Sympiesometer 29.20.—At 10. Hard squalls with a heavy swell: Barometer 29.75: Sympiesometer 29.12.—At 11. Wind NNW. and increasing, and sea rising.—Midnight. Blowing a perfect gale NW., and high sea. Barometer 29.62: Sympiesometer 28.90.

3rd.—A. M. Hard gale with severe squalls, and high sea.—At 2. Hard weather with thick heavy rain: Barometer 29.56: Sympiesometer 28.86.—At 4. Wind veering to WNW. and Westward: the topsails blown from the bolt ropes, leaving the ship under bare poles, the sea running very high: Barometer 29.50: Sympiesometer 28.78.—Daylight. The wind veering to the South-westward. Wore ship and set the mainsail; ship labouring much in the high confused sea, the rain ceasing.—At 7. The wind lulling at times, and weather clearing over the land, but a very high confused sea; the ship pitching and labouring much, in which we carried away flying-jib-boom, spritsail yard and dolphin-striker, and stove in the jolly boat, hanging at our stern: Barometer 29.70: Sympiesometer 29.0.—At 8. Wind decreasing at SSW.: enabled to bend new sails, and to set the fore-topmast staysail, and storm mizen, to steady the ship: Barometer 29.86: Sympiesometer 29.16.—At Noon. Weather much more moderate with less sea. Latitude 8° 58' North; in forty-one fathoms water.—P. M. Decreasing SWesterly, and Southerly breeze, and fine weather.—Sunset. Light Southerly breeze and fine: Barometer 29.86: Sympiesometer 28.20.*—Midnight. Land breeze, light and variable.

Ships along the Malabar Coast, and Magnetic Storm at Bombay.

By the zealous care of Mr. Scott, Secretary to the Bombay Chamber of Commerce, I have been furnished with several logs of ships along the

* The Sympiesometer is always 0.50 to 0.60, below the Barometer.

coast, shewing how they were just on the Northern range of the storm on the 2nd, 3rd, and 4th December: the 2nd and 3rd being, it will be recollected as above, the day of the *Charles Forbes'* storm, and the 3rd of that of *Cananore*, in latitude $11^{\circ} 52\frac{1}{2}'$ North. I note these for brevity's sake, in separate paragraphs.

The *Recovery*, Capt. Johnson, on the 2nd at noon, was in latitude $12^{\circ} 29'$ North; in forty-one fathoms water. Her barometer, a French one, at twenty-seven inches eleven lines, (equal to 29.76 English) having fallen to this, from twenty-eight inches one line, French (29.94 English.) From the 1st, during the day, had the land and sea breezes, but at midnight it was dark and cloudy.

December 3rd.—Dark cloudy and variable.—Noon. Strong wind with heavy head sea from the NW. Latitude $12^{\circ} 57'$ North; in forty-one fathoms water, wind NE. Barometer twenty-seven inches ten lines French (29.67 English) and in a note from Capt. Johnson says, "usually on the coast at this season, twenty-eight inches two lines, French (30.03 English).—At 3 p. m. A sudden squall with change of wind to the SSE. and very threatening appearance; by midnight, clear again.

4th.—1 A. m. Fresh breezes, cloudy, and heavy following sea from the SW. which continued to noon, when in latitude $14^{\circ} 53'$, North; and forty-five fathoms water; strong SSW. sea. No barometer marked this day.

5th.—Dark cloudy and unsettled, but light winds with strong swell from the SW. and a cloudy wild appearance. Latitude $16^{\circ} 40'$; in forty-one fathoms. Barometer twenty-seven inches ten lines, (29.66 English.)

Ship Charlotte.—Her Commander says in his note. From the 1st to the 4th instant. Land and sea breezes prevailed with hot sultry weather during the day, and cloudy with heavy dews during the night. On the morning of the 4th, the wind freshened up at North and continued freshening till noon, when it veered round to the NE. Sacrifice Rock then bearing NbE $\frac{1}{2}$ East; distant about six miles (latitude about $11^{\circ} 24'$ North) in soundings of from sixteen to seventeen fathoms.—At 3 p. m. The wind increased to a fresh gale at East, running before it under our topsails; the clouds dark and disordered, going from East to SE.—At 6 p. m.—The wind moderated to a fresh steady breeze,

made all sail, running along the land in soundings of nineteen to twenty-two fathoms. At 10 at night, the wind wore to the SE. and continued a steady breeze at South to SE. all next day. The 5th when at noon St. George's Island, bore NNE $\frac{1}{2}$ East. Latitude observation $15^{\circ} 11'$ North; distance off shore about ten miles; the weather moderating, but very hazy: the barometer and thermometer showed no symptoms of any change during the strength of the breezes: the latter part of the 5th decreasing winds with cloudy weather, with a cross turbulent sea.

Barque MARCHIONESS OF DOUGLAS.

Had fine weather from the 2nd instant; latitude $14^{\circ} 14'$ North, longitude $73^{\circ} 34'$ East, to the 4th instant in latitude $15^{\circ} 43'$ North, longitude $73^{\circ} 27'$ East. The winds moderate and light from NE. to NNW. and latterly SE.

Ship EARL OF CLARE.

Fine, land and sea breezes, from the 2nd instant; latitude $14^{\circ} 38'$, to the 4th instant, $16^{\circ} 17'$ North, while passing the Coast.

BOMBAY.

The recent Magnetic Disturbance.

The *Hurkaru*, in copying the letter we received sometime ago from Professor Orlebar, describing this phenomenon, makes the following observations, which we commend to the notice of the learned Professor himself, and all others interested in Meteorology.

“We extract from the *Bombay Courier* a letter from Professor Orlebar, in charge of the Observatory at Bombay, descriptive of a remarkable magnetic disturbance,—‘a magnetic storm,’ which was indicated by the apparatus under his care, on the morning of the 3rd instant. The Professor remarks that “it will probably appear that this week has been accompanied with remarkable phenomena on every quarter of the earth.” May not this unusual disturbance of the magnetic fluid have been in some way connected with the rotatory hurricane which was experienced by the *Hindoostan* off Ceylon, on the 1st and 2nd instant, and which, travelling to the NW. might have been sufficiently near Bombay on the 3rd to produce the phenomena observed by Professor Orlebar?”—*Bombay Courier*; December 30th.

Ship JOHN BROWN, R. BROWN, Commander. From the Bombay Chamber of Commerce.

From the log of this vessel, of which the track will be seen on the chart, it appears that on the 3rd and 4th December, she was running in to the ENE. ; towards, and in the passage between, the head of the Maldives and the Southern Laccadives, and that on the 4th at noon when with the *Charles Forbes*, the weather had quite moderated to fine, the *John Brown* was within a few miles on the same parallel of latitude as the *Forbes* on the 3rd, but about 170 miles West of her position, in longitude $73^{\circ} 29'$ East with steady breezes and gloomy weather, the wind about SW. and a heavy sea, which they supposed to be caused by a current setting to the ENE. Her barometer (probably too low) was at 28.80 ; the thermometer 87°.

Abridged Log of the Ship MARY ANNE, Captain ALLEN, from London to Bombay. Reduced to civil time. From the Bombay Chamber of Commerce.

At Noon 5th December, 1845.—Increasing breezes NNW. with a heavy head sea : Latitude $8^{\circ} 7'$ North : Longitude $71^{\circ} 15'$ East : Barometer 29.45 : Sympiesometer 29.30 : Thermometer $83\frac{1}{2}$ °.—Towards midnight decreasing and cloudy.

6th.—A. M. WSW., increasing to noon, when Latitude $9^{\circ} 54'$ North : Longitude $71^{\circ} 16'$ East : Barometer 29.40 : Sympiesometer 29.26 : Thermometer 82°: heavy confused sea from the Northward.—P. M. Wind West.—At 7, Southerly, rapid scud, much lightning and sea.—At 5 P. M. barometer fell to 29.35, and sympiesometer to 26.24.

7th.—Noon fine weather : Latitude $12^{\circ} 54'$ North : Longitude $11^{\circ} 0'$ East : Barometer 29.50 : Sympiesometer 29.36 : Thermometer $83\frac{1}{2}$ °. After which fine weather and calms.

Abstract of the Log of the Ship RAJASTHAN, Captain STEWART, from London bound to Bombay. Reduced to civil time. From the Bombay Chamber of Commerce.

On the 4th December, 1845.—Rajasthan was at noon in Latitude $9^{\circ} 55'$ North : Longitude $69^{\circ} 0$ East : Barometer 29.85 : Sympiesometer 29.42 : Thermometer $83^{\circ} 3'$.—A. M. Freshening to steady ; fresh wind from the

NN. Westward with a head swell, studding sails set, noon increasing and heavy head sea from NNE. and clear weather. 4 p. m. Observed the Barometer to fall suddenly to 29.70: Sympiesometer 29.32: wind increasing; in small sails. At Midnight. Fresh gales and cloudy.

5th December.—6 a. m. Split fore and main-topsails: wind rapidly increasing to a hard gale NW., and sea much agitated, rising in pyramids* and breaking frequently on the ship, hove to on the larboard tack, under mizen and fore-topmast staysails. Noon. Latitude 11° 42' North: Longitude 71° 5' East. Barometer, noon 29.85, 4 p. m. 29.70. Sympiesometer, noon 29.42, 4 p. m. 29.32. At 0.30. p. m. Wind shifted to WSW. tremendous sea running, and ship labouring violently. At 4 p. m. A heavy gust with rain, when the violence of the wind abated during the night, the wind rising in heavy gusts, with intervals of calm, a dark cloudy sky and drizzling rain.

6th.—4 a. m. Wind shifted to SE. and barometer "on the turn."† At 6. Fresh gales with passing squalls: made sail and bore away NNE., weather clearing up and sea rapidly going down. At 8. Single-reefed topsails. Noon. Latitude 12° 32' North: Longitude 71° 43'. Barometer, noon 29.70, 4 p. m. 29.60. Sympiesometer, noon 29.32, 4 p. m. 29.22. p. m. Steady breezes and showery, after which fine weather.

Captain STEWART has further obliged me with the following very instructive Remarks.

" 1. On the evening of the 4th December, I observed a remarkable kind of lightning to N. Westward, shooting up perpendicularly from the horizon in stalks, or columns, of two and three, at short distances; it was not at all bright, but rather of a dullish glare.‡

" 2. My barometer fell lowest on Saturday, after the greatest violence of the wind from NW. and SW. was past, which led me to expect that

* A remarkable instance, but which doubtless often occurs without being noted, of the pyramidal sea beginning very early in a gale: I account for it by supposing the NN. Easterly sea crossed and broken by the N. Westerly gale.

† It appears by this expression to have been lower than 29.70, between 4 p. m. of the 5th and 4 a. m. of the 6th, but is not, unfortunately, registered.

‡ This is almost, word for word, Capt. Rundle's description of this remarkable kind of lightning. See 11th Memoir, Journal Asiatic Society, Vol. XIV, p. 71, where I have also quoted another instance of it. We might almost term it "Typhoon lightning!"

when it shifted to South or SE., I should have the height of the gale; on the contrary, there was both less wind and sea.

“3. I consider that when I hove to at 6 a. m. of the 5th, with the wind at NW. or NWbW., the centre of the storm was NE. of my position, and passing to WN. Westward, so that by running on, I should have got into worse weather; and this is confirmed by the fact, that the ship *Monarch* a day’s sail ahead, experienced the extreme violence of the hurricane.

“4. With the exception of the singular lightning already mentioned, there was not a single flash, and the sky had more the appearance of a gale in the higher latitudes than a tropical storm, the scud passing swiftly in the direction of the wind with clear patches between, excepting the night of the 6th, when it was dark and lowering, with drizzling rain.

“5. The position of the vessel was correctly ascertained by observation, and the dates are all nautical time.”*

RATH. STEWART,

Com. Ship Rajasthan.

Abstract from the Journal of Captain McFARLANE, of the American Barque STAR. Reduced to civil time. From the Bombay Chamber of Commerce.

“*Thursday 4th December, 1845.*—A fresh breeze at NWbN. and cloudy. Latitude observation $8^{\circ} 41'$: Longitude by chronometer $66^{\circ} 43'$ E.: Thermometer 81° : fresh breezes at NWbN., and passing clouds. Through the night, a strong breeze at N. Westward.

“*5th.*—Noon, a. m. Strong gales at NWbN. and hazy. All this day we have had a heavy swell from NW., the vessel pitching violently. At 10 a. m. took in the top-gallant sails. Current setting to Southward and Eastward fifteen miles in twenty-four hours. Latitude observation $10^{\circ} 41'$: Longitude by chronometer $68^{\circ} 39'$: Thermometer 81° . First part of this day had strong breezes at NW., and quick passing clouds. At 6 p. m. Double-reefed the topsails; a heavy sea from NNW.: through the night strong gales from NW. to North, with heavy squalls and thick, cloudy, rainy weather.

* Altered by me to correspond with the other logs.—H. P.

"6th.—At 8 a. m. Wind NNE., more moderate; wore ship to Northward and Westward and made sail. Latitude observation $12^{\circ} 6'$: Longitude by chronometer $71^{\circ} 24'$: Thermometer 76° . At meridian the NW. point of Cherbaniani Bank or Reef, bore ENE $\frac{1}{4}$ N., fifty-five miles distant. The course and distance for this day's run was NEbE $\frac{1}{2}$ E. 180 miles distance, whereas the course and distance by dead reckoning was North 33° East, 135 miles, which would make the current setting EbS $\frac{1}{2}$ S. ninety-five miles! I was prepared to find a good deal of Easterly current here, but did not expect any thing like this. The very heavy swell we have had, which has caused the vessel to pitch and strain very much, has arisen no doubt from this cause. Since we have got into the vicinity of these (Laccadive) Islands, we have had a very thick heavy mist, it being a mere chance that I was enabled to get observations, the sun appearing but a very short time. p. m. Strong breezes at EbN. and thick hazy weather: a large irregular swell. Through the night fresh gales and cloudy.

"7th.—Fresh breezes at ENE. and a confused irregular swell. From my observations this day, it would appear that there was some mistake in yesterday's work, otherwise we have had as much Westerly current this day, as we experienced yesterday in the opposite direction. Latitude observation $14^{\circ} 55'$: Longitude by chronometer $69^{\circ} 52'$: Thermometer 79° ."

WILLIAM McFARLANE,
Master of American Barque Star.

Memorandum and Notes from Capt. DUNCANSON, Ship MONARCH. From the Bombay Chamber of Commerce.

| 1845. | Lat. N. | Long. E. | Adie's Symp. | Remarks. |
|----------|------------------|------------------|--------------|--|
| Dec. 1st | $11^{\circ} 56'$ | $68^{\circ} 14'$ | 29.58 | Fine clear weather. |
| ,, 2nd | $11^{\circ} 55'$ | $69^{\circ} 5'$ | 29.50 | { Strong monsoon with a very cross sea. |
| ,, 3rd | $12^{\circ} 16'$ | $70^{\circ} 29'$ | 29.42 | A heavy cross sea. |

At 10 p. m. Squally, and wind variable from the Northward, a dark cloud rose to the Eastward, which rapidly spread overhead, with vivid lightning and loud thunder, with a very threatening appearance. Sympiesometer fell to 29.30, and now beginning to blow hard; proceeded to get the ship under bare poles as fast as possible.

4th Dec.—Gale continued increasing till 1 A. M., on the 4th, when it blew a complete hurricane. Sympiesometer down to 28° 90. The starboard cutter (a twenty-five feet boat) was blown from the davits, and the ship laid with her lee rail under water. At 8 A. M. A little more moderate, but a tremendous sea running; the wind gradually veering round from NNE., where it began, to Southward. At noon it commenced with redoubled violence, being then in latitude by account 13° 40' North and longitude 69° 6' East, and veered to WSW., then backed round to NE., blowing furiously all the time till 8 A. M., on the 5th, when we set some sail, having been lying to with a tarpaulin in the mizen rigging, for thirty-two hours previous. The sympiesometer began to rise about 5 A. M., and at noon was at 29° 31', then in latitude 13° 20' North, and longitude 70° 20' East by account.

6th.—Strong breezes from NE. with hard squalls, veering to SE. with much rain, and a most cross, heavy sea. Latitude 13° 50' North: longitude 70° 3' East: Sympiesometer 29° 47. Experienced a current of forty miles to the Westward.

JOHN DUNCANSON,
Commander of Ship Monarch.

Ship EUPHRATES.

The ship *Euphrates* Capt. Gifford, was on the 3rd December at noon in latitude 14° 35' North: longitude 69° 58' East, with a strong breeze NNE. and clear weather, becoming cloudy with lightning to the Southward: at midnight, she was standing in towards the Coast.

4th Dec.—At 3 A. M. The wind *shifted* suddenly in a hard squall to East with a threatening appearance. Barometer 29° 85; the winds variable from the Eastward till noon, when a heavy head sea, (from the NE. to North.) Latitude at noon 15° 16': longitude 71° 28' East. After this time the weather was fine, the barometer gradually rising as the ship stood to the Northward.

SUMMARY.

We have now to consider the data we have for laying down the track of the storms as I have marked them on the chart.

Our first log to the Eastward is that of the *Caledonia*, which at noon on the 29th, was in latitude $6^{\circ} 50'$ North : longitude $88^{\circ} 30'$ East.* By midnight the weather was decidedly threatening, and the swell from the SW. increasing, the barometer having fallen to 29.70, with a fresh breeze from South to SSE., going about seven and seven and a half knots. We may fairly then assume, that she was now on the Eastern border of the vortex, and taking the average wind at SbE., that it bore WbS. of her. It will be noted that the *Alibi* was running up between the 28th and 29th to the Northward across the *Caledonia's* track, and experienced no bad weather, though traces of the stormy action may be found in her remarks.

The *Juliana* on the 27th, seems evidently running up into the South-western quadrant of a Storm Circle, (or into a *segment* of the forming vortex ?) which by daylight of the 28th, had passed onwards, and was veering and hauling gradually, like the broken *streams* of wind, of which I have, in former Memoirs, supposed the existence, to SW. and to SSE., SE. and Easterly, when it became another, and a different storm, from the *Caledonia's*, as we shall presently shew.

To estimate the centre on this day, the 29th, we have but its bearing from the *Caledonia*. Its distance from her to the Westward I estimate as follows :—

We find that on the 30th, the *Caledonia* was at the true calm centre of her hurricane in latitude $7^{\circ} 0'$, longitude $85^{\circ} 50'$; and that a little after midnight between the 1st and 2nd, say at 1 P. M. of the 2nd, the *Hindoostan* Steamer also, doubtless steaming through the centre of her hurricane. Taking the *Caledonia's* hurricane and the *Hindoostan's* to be the same ; this is from noon 30th to 1 A. M. of the 2nd, thirty-seven hours, and the distance between the positions is 218 miles, which gives 5.9 miles an hour for the rate of travelling of the vortex, or 141.5 miles per day. Now we find that the *Caledonia* in the twenty-four hours from noon of the 29th, to noon of the 30th, had made 160 miles of run, of which ninety miles were run from noon to midnight, and by 7 A. M. she was obliged to lie to, and at 10, was on the verge of the calm centre, in which at 11, she was fairly involved ; or say she had made the

* Her position on the 28th, is marked from the memorandum before alluded to. Nothing being said of the weather from noon 28th, to noon 29th, I presume it was fine, and the track shews how the ship was running towards the hurricane.

remaining seventy miles in ten hours, allowing a little for the storm wave ? the total rate of her run would then be 160 miles in twenty-two hours, or say, 7.3 miles per hour, or 1.4 miles faster than the vortex was moving before her.

If we assume the hurricane to have moved at this rate above mentioned, 5.9 miles per hour, it follows that the ship in the twenty-two hours that she was chasing it, only gained upon it at this rate of 1.4 miles per hour, which would give her distance at noon on the 29th, to have been really only thirty miles from the centre ! and yet with only a double-reefed topsail breeze.

This would give but sixty miles of diameter, but though we have had, it is true, instances of hurricanes which like this have not much exceeded, as far as we could judge, sixty miles in diameter, yet I am inclined to allow it somewhat more than this, and we must therefore suppose, either that it was not completely formed at noon of the 29th, though the *Caledonia's* barometer (29.70) would indicate that it was enough so to produce the usual barometric depression, or that it was at a greater distance and moving at a slower rate.

We have no sort of indication to guide us in this estimate, so that I have, as a mere matter of choice and probability, placed the centre this day at fifty miles WbS. from the *Caledonia's* position, which gives it 100 miles of diameter. It could not have been much more, for we shall see that on the 30th, when she was *within* the calm centre, the *John Wickliffe*, at eighty-two miles to the SbE. of her, was barely experiencing the remote effects of the swell, in pitching away her flying jib-boom, while her wind, though Westerly, was declining to calm. The *John Wickliffe*, as she ran up, must have crossed, at about 8 A. M., on the 1st, the place of the centre a little before noon of the 30th. We find that the heavy head sea is again noted, P. M., but not at midnight, perhaps this is an omission in copying, or of a careless officer ? It would have been of interest to have found traces of the confused sea of the centre at the very place of it, as we have done in other instances.

The storm had not formed and moved onward at the same rate on the 28th, for then, as will be seen by measuring backwards on the chart, the *Alibi* would have had very different weather. We shall find in our examination of the *Hindoostan's* log for the day in which she steamed *through* the hurricane, that its diameter then (on the 1st and

2nd,) close to the coast of Ceylon, did not certainly much exceed 120 or 130 miles.

On the 30th, we have the *Caledonia* in the centre, which we must therefore place at her position for this day. It is curious to remark that though the vortex was certainly moving on at the rate of 5.9 miles per hour, as we know from the time when it was crossed by the *Hindoostan*, yet the *Caledonia* seems to have lain from 11 a. m. to 6 p. m. in the calm! so that either she was carried along with the centre? or the calm space was from thirty to forty miles in diameter, and she was by the baffling SW. and Southerly winds carried round and round in it?* It will be seen that while the longitude was found to agree with the account, it was the latitude which differed fifty miles from the observations when obtained. If the ship had been carried along by the vortex for the seven hours, this must have been detected by the error in longitude. It would be a curious fact to find a storm of not more than 100 miles in diameter with a calm space of thirty miles! so as to make the zone of hurricane surrounding it only thirty-five miles in breadth. There is some countenance given to the idea that there really was a state of things approaching to this, from the fact that during the calm interval Capt. Burn, though evidently most attentive to his barometer, &c. only calls the sea "a very heavy swell." If the calm centre had been of the usual limited extent he would certainly have had somewhat of the dangerous confused pyramidal sea so often adverted to, and so well known to every sailor who has been through a China Sea Tyfoon,† that he never afterwards forgets to name it. The extent of the calm also accounts for the little sea found by the *John Wickliffe*. If these conjectures be correct, we have here a new class of circular storms which we might call Zonal, or Annulars, storms. And I venture to propose a name for them so early, merely for the purpose of calling attention to this singular peculiarity. The note in my Thirteenth Memoir, at p. 716, where Mr. Rechendorf describes the dust whirlwinds as a mere wall or zone of dust, will readily occur to those who have followed the subject. Mr. Thom speaking of the great storms of the

* Though these ought simply to have carried her to the Northern side of the calm centre: Northerly and even variable winds are not spoken of; perhaps an omission? for the log is seldom correctly kept in such weather.

† The *Caledonia* is a Bombay and China trader of 1000 tons, and Captain Burn, I have no doubt, has been in more than one Tyfoon.

Southern Indian Ocean, p. 201, says that "in the early stages it is probable the *calm* is very extensive and embraces several vortexes, which gradually merge into one," but it will be noted that we have here a "calm" of one-third of the whole space of the storm.

The centre for the 1st of December, we can only place by calculation, as to its probable position, between noon 30th, with the *Caledonia*, and 1 A. M., on the 2nd with the *Hindoostan* as calculated at p. 907, and assuming it to have travelled in a straight line. It would seem that the vortex expanded about this time, since it reached the *Hindoostan*, and being deflected or flattened, no doubt, by the high mountains of Ceylon, was with her not a NN.Westerly wind, which a true circle would require, but a Northerly wind which the coast hills would naturally produce. The warmth noted by Capt. Moresby, was probably the effect of the heated shores. At 1 A. M. on the 2nd, the *Hindoostan* was *at* the centre and *steaming* through the Eastern side of it! This ship's experiment, and I do not recollect that such a one has been performed before, gives us tolerable data for one important determination, which is the whole diameter of the vortex. The diameter of the calm space we cannot deduce from it, because she evidently steamed not through the middle, but through the Eastern edge of the calm centre.

If she had been far enough from the Ceylon shore for us to consider the Storm Circle as quite uninfluenced by the high land, our deductions would no doubt be more accurate. I have already noted that I make the storm arrows on the chart to form an oval and wavy, to represent this effect of the mountains, and that I consider the warm winds as coming from the heated shore, and that it is owing to this deflection that the *Hindoostan* had the wind North instead of N.Westerly, as she should, and probably would, have had it in the open sea.

We may consider her as entering upon the verge of the storm, at noon of the 1st when her barometer is at 29.71, and the gale seems fairly to have begun. From this time to noon the next day the log marks 135 miles of run, but the true distance is 110, which proportion we must use to calculate the distance run to 1 A. M. on the 2nd, when the wind " lulled suddenly, and shifted round to the Southward, and blew a perfect hurricane from the SE." Her run up to this time, then, is by log, seventy-one miles, but the correction above noted being the proportion of 135 : 110 :: 71 : 58, reduces it to fifty-eight miles, which

we must take as the nearest approximation to the semi-diameter of the (somewhat flattened?) vortex, or 116 miles for the diameter; which agrees well with what we estimated it to be from the *Caledonia's* log. We further see by Capt. Biden's note, the extract from the *Colombo Observer*, and Mr. Higgs' valuable register, that while the centre was passing over Baticolo at about half-past two in the morning, (the calm focus there seems to have been quite small in extent,) it was blowing from the East in "most violent gusts," at Trincomalce, which is about sixty miles in a NNW. direction from Baticolo, which gives 120 miles of diameter for it on shore.

The Baticolo description remarks, indeed, that "*the hurricane*" did not extend to the country about the South extremity of the lake, which extends about twenty miles from the flag-staff; but by this phrase, the writer probably means that, although there was a gale, yet it was not as at Baticolo, a *hurricane*, levelling every thing before it. Places situated towards the Southern half of a Storm Circle, where it infringes upon high land, and comes straight in from the sea, *should* also be partially sheltered; while those on the Northern side (Trincomalee in this case), should feel its full force; because, if we follow the wind in its circuit, we shall see that the outer zones of it to the North-west, must be impeded by the high land. A centre at Baticolo giving a strong gale at Trincomalee, would extend sixty miles inland to the Westward, over a perfectly flat country; but the first mountain ranges of considerable elevation, certainly approach within twenty-five or thirty miles of the coast. I have endeavoured to mark this effect on the chart by the Baticolo circle of wind-arrows, making them wavy and broken as they skirt and turn off from the mountain ranges; noting, however, that this is merely to express my views of the *probability* of what took place.

The calm at the Basses is also accounted for by their being so completely sheltered and by their distance from the centre. The gales at Colombo are described as being, "brief though severe." They were possibly streams of wind forcing their way through defiles of the mountains? for the vortex if it continued entire above, must have been much divided and broken up below, and probably indeed "lifted up" by the very high land in the interior of Ceylon.

The Trincomalee report from Mr. Higgs requires some farther notice, its barometrical register giving it especially a high value. We find that

it had increased to "violent gusts" from NEbN.,* the barometer being at 29°.68, the strength of the wind being as 7.; and that at 2 p. m. there were "most violent gusts," the strength of the wind being 9., and the barometer still between 29°.68 and 29°.66, at which it stood at 6 a.m. It might no doubt have been found lower in this interval if observed, and it was at half-past two that the centre was passing over Baticolo.

Centre of the 2nd December.—We have now to follow the storm and assign a place for the centre on the 2nd December, bearing in mind that from Baticolo to Tunicoreen Roads is, in a straight line, 222 miles, with the high land of Ceylon between them. The centre passed Baticolo on the 2nd, at $2\frac{1}{2}$ a. m., and the *Florist* seems to have been wrecked in Tunicoreen Roads only about ten, or at most twelve hours later, that is in the night between the 2nd and 3rd. Hence this could scarcely be the same storm which had passed Baticolo, for if so, it must have, all at once, travelled at the rate of nearly eighteen miles an hour; and this notwithstanding the obstacles which the chain of Ceylon mountains must have presented. I am inclined then rather to suppose that this storm, which at or about midnight, 2nd and 3rd, was SE. at Tunicoreen; Westerly with the *Faize Rubahny*, between Cadiapatam Point and Cape Comorin; NW. with the *Charles Forbes*; a gale at Trevandrum, Quilon, Alleppy, Tinnevelly, and Ootacamund (no direction of the wind is given in the notes from these places); a "very violent gale" at East and SE. at Palamcottah; a "violent gale" at NE. on the morning of the 3rd at Cochin; and NE. and East, veering to SE. and SSW. at Cananore, at 8 a. m. to 1 p. m. on the 3rd. I am inclined to think then, that this storm was a new one, generated very possibly by the atmospheric disturbance to the East of Ceylon. The circle which I have marked on the chart then between Palamcottah and the *Faize Rubahny*, may be supposed to be the *average* position of the centre of a new storm, at midnight between the 2nd and 3rd, as far as any place can be assigned to it with uncertain data, and in a mountainous country.†

By noon of the 3rd, we find the *Charles Forbes* with the wind, which had rapidly veered with her since midnight, S. Westerly with nearly fine weather. At Cochin at noon it was Southerly and S. Westerly, and

* Advancing to the North beyond Baticolo, the high land trends farther inland to the West, so that the coast being lower, less interruption was given to the vortex.

† See postscript.

it was moderating from SE. and SSW.; so that we may take it at this time to have been clear of the coast, and assuming that it extended from the *Forbes'* position at midnight, to near Cananore, it was now a storm of 240 miles in diameter; but this could not be the case, for whatever the Cananore gale* was owing to the wind was S. Westerly, at daylight on the 3rd with the *Charles Forbes*, and N. Easterly at Cochin, and had left the *Faize Rubahny*; shewing that this vortex was of small extent, and that its centre lay between the *Forbes* and Cochin. I shall afterwards shew that the Cananore storm was probably that of the *Juliana*, *Frances*, and *Morley*.

The logs of the ships *John Brown* and *Mary Anne*, which were to the Westward of, and between the Maldives and Laccadives, give us no traces of the *Charles Forbes'* storm on the 4th and 5th, except in a heavy swell felt by the *John Brown*; so that it may have broken up or exhausted itself in the tract between the coast and these Islands, or have travelled on to the positions of the *Rajasthan* and *Monarch*, on the 5th and 6th, which we shall afterwards consider.

We must now return to the Bay of Bengal again, to take up the storm experienced by the *Juliana*, *Morley*, *Myaram Dyaram*, and *Frances*, as having precedence in order of time.

We noted p. 905 that the *Alibi* in running up across the *Caledonia'*s track, and nearly due North, between the meridians of 89 and 90°, experienced no bad weather, though some traces of the stormy action might be found in her log. It would appear that she had on the 29th in latitude 9° S' North, heavy squalls and sea from EbN. and ENE. to South, and again to NE. after midnight, but nothing that could be called a severe gale, though her barometer was low, and she saw that the weather was threatening to the Westward on the 30th, when she was in about 12° North.

The *Juliana* clearly ran into a circular storm, having the winds first varying from NNW. to West, then to SW. and moderating for a time (which so frequently occurs) towards noon on the 28th, when she was always running on to the NW. She crossed the track of her storm behind or to the Eastward of its centre, and had a gale from the NE. obliging her to lie to, at 11 A. M. on the 29th.

* The account it will be noted is a very loose one.

We have no data for assigning any centre to this storm on the 28th, if indeed it was formed at this time, but we can only conjecture it to have been, if formed, to the North and NE. of her on that day. On the 29th, however, we may fairly say that her NNE. and NE. gale was part of a true vortex, and that the centre bore about SEbE. from her. We can only estimate, or suppose, a distance for it, and this a very limited one, for if a vortex of large extent it would interfere with the Storm Circle of the *Caledonia*. That it was not a part of the *Caledonia*'s storm, I infer from the fact that the distance between the two ships (both their positions being well ascertained) is upwards of two degrees, and their difference of longitude very small; so that the NE. gale of the *Juliana* cannot be made part of the *Caledonia*'s circle, without carrying this last to reach the *John Wickliffe*'s track, and include her on the 30th, when she had fine weather and calms.

On this account then I have marked the *Juliana*'s storm for this day, as a separate one, also of small extent.

On the 30th we have the *Juliana* with an Easterly gale moderating at noon, while the *Morley*, to the ENE. of her, has hers just beginning at SSW. and was undoubtedly running on to the WNW., being bound to Madras, so as to overtake the more central parts of the storm which gave her the shift of wind to the Eastward, and the half an inch fall in her barometer. We have unfortunately here again but a meagre memorandum, in which the position of the ship for the 29th and 1st are wanting, when these would have been of the greatest importance to our research.

Of the *Myaram Dyaram*'s hurricane, all we know is, that she had the wind more Easterly than the *Caledonia*, and occasionally to the North of East.* We know so little as to date and her position, that we are compelled, merely to *suppose* that it was on this day she had it most severely, and was in distress; one account (Captain Faucon) saying it was on the 1st, and another (Captain Twynham) on "the same day as the *Caledonia*," which would be the 30th, and her position gives the greatest probability to its having been on the 30th.† I have therefore placed the

* Letter from Captain Twynham.

† Captain Twynham, and Captain Faucon both mention that the *Myaram Dyaram*, "a short time" or "a few days" before the gale fell in with a vessel from Moulmein,

centre of this storm for this day close to the Southward of the *Myaram Dyaram*, and have just included in it the position of the *Frances*, which ship was evidently on the Southern and S. Eastern verge of a storm, and as far as we can judge by her meagre note, ran up on its Eastern side. It will be noted also that her position on this day with a Westerly and S. Westerly gale reduces greatly the Storm Circle of the *Caledonia*, proving that it could not even have been of 100 miles in diameter.* The fact of two small vortices so nearly parallel to each other is very remarkable, but the evidence for it appears to me, on this day especially, to be unquestionable, and if the *Myaram Dyaram*'s storm commenced on the 28th, the two storms may have been also both formed on that date.

We have no farther trace of this storm after the 30th, and thus are uncertain if it broke up or amalgamated with the *Caledonia*'s, *Hindoo-stan*'s, and Ceylon storm, or if it continued its track farther as a small independent storm to the Coromandel coast, and crossing the Peninsula, forced its way through the Palgatcherry Pass, and produced the Cananore, *Rajasthan*'s, or *Monarch*'s storms in the Arabian sea?

We can only intimate, or consider that this might be possible, and the heavy storm at Ootacamund, which is twenty-seven miles North of the Palgatcherry Pass, and nearly three degrees North of the centre of the storm we have traced near Cape Comorin, lends some countenance to this view; for a small storm might easily have landed about Porto Novo, between Pondicherry and Point Calymere without any reports or accounts of it being taken or obtained. The threatening weather seen to the SE. from Madras *might* have been the outskirts of it.

We now return to the Arabian Sea. I have shown at p. 911 that the *Charles Forbes*' storm may have been broken up amongst the Laccadives, or it may have joined its force to that of the Cananore storm, and both together have formed that which the *Rajasthan* experienced from the 4th to the 6th. We have seen that at noon the *Charles*

in distress, having no one to navigate her on board, and that she assisted her with an Officer and two Lascars. On her arrival at Point de Galle, two days after the *Myaram Dyaram*, it was found that she had fallen astern, and to the Northward of the *Myaram*, and though she felt the sea, had no violent winds. Her position being quite uncertain, we can only notice this.

* The *Caledonia* might even on this day have been further to the Northward, as she found on the 2nd that she was 50' North of account.

Forbes' storm was clear of the coast, and that at Cananore it was a gale on the 3rd, from 8 A. M. to 1 P. M. from NE., East, and SE., and that the ship *Charlotte* had no bad weather on the coast, being between Cochin and Cananore till the 4th; showing that this Cananore storm was of very small extent, and that the Cochin storm also did not reach much beyond that latitude. It is therefore *more* probable if the *Rajasthan's* storm came from the coast, that it was the *Charles Forbes'* travelling up in a NW. direction. Of the probability of this as to time and distance, we shall be better able to judge, when we have fixed the position of the *Rajasthan's* storm. That of the *Monarch*, which Captain Stewart supposes to have been the same, was evidently a different one, *preceding* that of the *Rajasthan* by fully eighteen hours.

It appears that on the 4th at 4 P. M., Captain Stewart observed a sudden fall of the barometer and sympiesometer, and that by noon of the 5th, the wind had increased to such a degree from the NW. that he judged it prudent to heave to, considering himself, as he observes in his note, in the South-western quadrant of a circular storm, which he no doubt was, and, from the sudden shifts, not far from the centre. I have therefore assigned it a circle of eighty miles in diameter only, which will allow her to have been twenty-five miles from the centre at noon, and in so small a vortex this seems quite a sufficient allowance. I am indeed inclined to consider this storm as one which was of much greater extent above, than at the earth's surface, thus affecting the barometer from 4 P. M. of the 4th; but not of any great violence, since the ship was running on, though her Captain clearly understood his position, till 6 A. M. The circumstance of the barometer remaining so low, with gusts at times though the force of the wind had, as it proved, passed over, is an additional motive for our supposing that the vortex may have been of much greater extent above.

The *Monarch's* hurricane as I have remarked, was evidently earlier in time, though this ship was considerably to the N. Westward of the *Rajasthan*.

It is remarkable that the *Monarch* seems to have seen the vortex spreading overhead at 10 P. M. on the 3rd, when her sympiesometer began to fall, and in three hours by 1 A. M. on the 4th, she had it blowing a complete hurricane, and at noon on that day she was at the centre of it. She laid to till 8 A. M. of the morning of the 5th, (the day of the *Rajasthan's*

or Cananore storm it will be remembered,) and then gradually made sail with the returning fine weather.

We can by no means positively connect these storms with those of the coast, though there is nothing impossible in their being connected, for taking the *Monarch's* to have been the Cananore storm, it must have travelled about 380 miles, or sixteen miles an hour, in the twenty-four hours between the 3rd and 4th, a rate at which no doubt our storms frequently *do* travel, and its rapid approach to the ship shews that it really was moving fast. It did not quit her so soon as it might be expected it would do, because she was for a time apparently blown round the circle, and thus drifting with the storm.

The *Rajasthan's* storm may be supposed to have been that of the *Charles Forbes*, without assuming any high rate of motion, for, as we have shewn, that vortex was just clearing, or clear of, the land by noon on the 3rd, when it would require only to travel about 300 miles in two days, or 150 miles per day, or a little more than six miles per hour to reach the *Rajasthan*.

Conclusion.

We are much struck when considering these remarkable small storms with their close analogy to what we see of water-spouts at sea, and with dust-whirlwinds on shore, which so frequently seem to move on in pairs or threes along the same paths: and yet withal, diminutive as we may comparatively term them, they seem to have been, for the *Myaram Dyaram*, *Caledonia*, *Hindoostan*, and the unfortunate station of Baticolo on the East side of the Peninsula, as well as with the *Monarch*, and nearly with the *Rajasthan*, of true hurricane, or rather considering them as to size, *Tornado* violence. They thus become, from the short warning which they afford, even more dangerous than storms of greater extent, which allow of twelve to twenty-four hours for preparation; and while they add a new page* to our

* Though not wholly an unexpected one. See X. Memoir. The *Coringa Packet's* and H. M. S. *Centurion's* storms off Ceylon; Journal Asiatic Society, Vol. XIII p. 113.

knowledge of Indian hurricanes, they give, as every successive investigation seems to give, a new lesson to the seaman which he has only to profit by.

The regularity with which, in spite of the mountains of Ceylon and of Southern India, they seem to move on, in about the average track is also remarkable.

POSTSCRIPT.—While this paper is going through the press, I obtain the log of the Barque *Victoria*, Captain Hyde, which ship on her voyage from Calcutta to Bombay, had from 11 p. m. of the 2nd, and morning of the 3rd December, a heavy gale from the North to NW. and SW., but which abated by 9 a. m. At 6 p. m. of the 2nd Quilon Flag-Staff bore $N\frac{1}{2}W.$; and at noon on the 3rd, the latitude was $8^{\circ} 31'$ North, by observation. This ship was therefore a little to the north of the *Charles Forbes*' position, and proves our estimation of that storm as marked by the outer arrow to be correct.—H. P.



Proceedings of the Asiatic Society of Bengal, DECEMBER, 1845.

The stated monthly meeting of the Society was held on Wednesday evening, the 3rd of December, T. W. Laidley, Esq., senior member present, in the chair.

The following members proposed at the last meeting were ballotted for and declared duly elected.

J. Christian, Junior, Esq., Monghyr.

W. Taylor, Esq. B. C. S.

Augustus Wattenbach, Esq.

Donald Mackay, Esq.

Ensign F. W. Ripley, 22nd N. I.

L. C. Stewart, Esq. M. D. Assistant-Surgeon, H. M. 39th Foot.

W. Theobald, Esq. Barrister at Law.

T. C. Jerdon, Esq. M. D. Madras.

And the following new member was proposed :

Walter Elliott, Esq. Madras C. S.,—proposed by the Secretary, seconded by the President.

The proceedings of the meeting of November were read and confirmed.

Read the following list of books, presented, exchanged, and purchased :—

List of Books received for the Meeting of Wednesday, the 3rd December, 1845.

PRESENTED.

1. *Tijdschrift voor Néerlands Indië*. Zesde Jaargang, Batavia, 1844, 12 Nos. Zevend Jaargang, 1845, 8 Nos.—By the Batavian Society.
2. *Natuur-en Geneeskundig Archief voor Néerlandsch Indië* Eerste Jaargang, Batavia, 1844, 4 Nos. Tweede Jaargang, 2 Nos.—By the Society.
3. *Verhandelingen van het Bataviaasch Genootschap*, Volumes 1st, 5th, 7th, 8th, 11th, 12th, 15th, 16th and 17th, Nos. 2 to 7, Vol. 20th.—By the Society.
4. *Korte Beschrijving van het Zuid-Oostelijk Schiereiland van Celebes*, door J. N. Vosmaer.—By the Society.
5. *Nederduitsch en Maleisch, en Maleisch en Nederduitsch Woordenboek*, door P. P. Roordavan Eysinga, Batavia, 1824-1825, 2 Vols.—By the Society.
6. *Catalogus Plantarum in Horto Botanico Bogoriensi Cultarum Alter. Auct.* J. C. Hasskarl. Bataviae, 1844.—By the Society.

7. Islandick Almanac, two copies, by B. Kamphövener, Esq.
8. Danish Almanac, two copies, by B. Kamphövener, Esq.
8. Danish Spelling book, two copies, by B. Kamphövener, Esq.
10. *Della Famiglia Filologica delle Metonimie Arabe*, by J. V. Hammer Purgstall, Milano, 1844.

ADDITIONS.

- 11.
12. *Turjama Tul Lazim*, Arabic. Presented by H. Torrens, Esq.
13. *La i Hotul Fala Letalimuzoarat*, Arabic.—By the same.
14. *Ussul-Handaza*, Arabic.—By the same.
15. *Al-Jyharul-Badia*, Arabic.—By the same.
16. *Adad Ansab*, Arabic.—By the same.
17. *Taribatus Saphia*, Arabic.—By the same.
18. Meteorological Register for September and October, 1845, from the Surveyor General's Office.
19. *Calcutta Christian Observer*, November, 1845.—By the Editors.
20. *Oriental Christian Spectator*, No. 11, November, 1845.—By the Editor.
21. London, Edinburgh, and Dublin Philosophical Magazine, third series, No. 177, July, 1845.—By the Editor.
22. *Journal of the Royal Asiatic Society*, No. 16, part I. 1845.—By the Society.
23. *Journal Asiatique*, 4me. Série, Tome 5, No. 23, 1845.
24. *Report of the 14th Meeting of the British Association for 1844*. London, 1845, 1 Vol.—By the Association.
25. *Bulletin de la Société de Géographie*, Tome 2nd, 1844.—By the Society.
26. *Annales des Sciences Physiques et Naturelles de Lyon*, Tome 7, 1844.—By the Royal Agricultural Society of Lyon.

EXCHANGED.

27. *Journal of the Agricultural Society of India*, Vol. 4, part 3.
28. *Athenæum*, Nos. 932 to 935, for 1845.

PURCHASED.

29. *Annals and Magazine of Natural History*, No. 104,—September, 1845.
30. *Journal des Savants*, Avril, 1845.

The Secretary stated that in reference to the enquiries directed to be made as to the sales of the Society's publications likely to be effected at Agra by the Rev. Mr. Moore, the Sub-Secretary had received from that gentleman a note shewing that the total sales effected by the School-Book Society of Agra, in 1844, were :

| | | | | |
|----------------------|-----------|-------|----|---|
| Sanscrit books,..... | Co.'s Rs. | 1,124 | 12 | 0 |
| Arabic,..... | | 38 | 12 | 0 |
| Persian,..... | | 197 | 14 | 0 |
| Total,..... | | 1,361 | 6 | 0 |

An amount which will no doubt be extended with a larger stock from which to choose.*

The Secretary laid before the Society the model of an iron rail, which he suggested might be advantageously put up in lieu of the brick wall which now separates the premises of the Society from Park Street. This alteration would be observed greatly improve not only the appearance of the Museum, but also that of one of the principal thoroughfares of the European quarter of the city. He laid before the Society an estimate at an extremely low rate, and proposed that the cost should be met by subscription.

The putting up of the iron rail was approved by the meeting, and the mode of having the work performed referred to the Secretary for further arrangements.

The Secretary, in fulfilment of his promise to report, with reference to the purchase of certain standard books, upon the funds of the Society, now stated that the amount to credit was Rs. 12,800 in Government securities; but that in addition the Society had a claim on the estate of the late Csoma de Korosi for Rs. 5,000 left to it by him. This bequest had been challenged by persons, Austrian subjects, representing themselves as his relatives, and the monies had been paid over to the Registrar of the Supreme Court; as however three years had elapsed without any rejoinder to the reply of the Society to that challenge, he suggested that the money should be claimed provisionally on its behalf, security being given for the amount; this would leave the Society with Rs. 5,000 for a commencement of the purchase of the books alluded to, in addition to the charges entailed by certain forthcoming Nos. of the Transactions, Dr. Hæberlin's Sanscrit Anthology, and other charges.

The proposal to apply for the legacy, giving security for the amount, was agreed to.

The following resolution was hereupon moved by the President, seconded by J. Ward, Esq., and carried unanimously.

The funds of the Society being reported at 12,000 Rupees, and the claim on the estate of the late Csoma de Korosi being for 5000 now in the Registrar's hands, it is proposed to demand payment, on security, of the said 5000 Rupees, for purposes immediately connected with the pursuits of the Society, instead of (at this moment) breaking in on our funded money.

* Lists of the Asiatic Society's Works in Hindi, Nagree, and Bengalee, are in preparation by order of the Secretary, and will be widely circulated.—Eds.

The Secretary reported that the staircase having been attacked by white ants, he had deemed it necessary to have the casing stripped off, and as a part of it was sinking he had farther, under the advice of Colonel Forbes and Mr. Mornay, had it properly raised; but as the placing of an Iron pillar for support at each angle would have been expensive he had at the suggestion of the Sub-secretary and with Colonel Forbes' approval, taken two of the sandstone Hindoo Pillars from the portico, to use as props, for which they answered perfectly and were not the less favourably exhibited as antiquities.

Read the following letters from the Secretary to the Government of India :

No. 2821 of 1845.

FROM G. A. BUSHBY, Esq., *Offg. Secretary to the Government of India.*

To H. TORRENS, Esq., *Vice President and Secretary Asiatic Society, of Fort William,*
the 15th November, 1845.

FOREIGN DEPARTMENT.

SIR,—I am directed to request that you will convey to the Asiatic Society the thanks of His Honor the President in Council for the 100 copies of Lieutenant Postans' translation of the Toofut ul Kiram, a history of Scinde, which accompanied your letter of the 7th Instant to my address.

G. A. BUSHBY,
Offg. Secretary to the Government of India.

Fort William, the 15th Nov. 1845.

Read the following letter from the Seeretary to the Araratian Society :

H. TORRENS, Esq., *Secretary, Asiatic Society.*

SIR,—I am directed by the Committee of the Araratian Society to own receipt of your letter of the 20th ultimo, and to request your acceptance of their united acknowledgments for the valuable gift accompanying your said letter, as likewise for your having kindly inscribed our Society for the future copies of your Journals.

P. J. SARKIES,
Secretary, Society of Ararat,

Calcutta, 11th Nov. 1845.

The Seeretary intimated that he had received two private letters from Lieutenant Fletcher Hayes informing him that he was busy in carrying into effect his intention of publishing a grammar and voeabulary of the Belooelhee language, &c. &c.

Read the following letter.

To the Secretary of the Asiatic Society, Calcutta.

MY DEAR SIR,—Permit me to solicit your kind assistance. I believe as far back as 1834 a paper was published by Mr. G. A. Prinsep regarding the introduction of steam navigation into India.

This publication contained valuable and interesting matter relating to the peculiarities of the Ganges, combined with that of Rennell and Colebrooke.

I am given to understand the information is to be found in the Journal of the Asiatic Society published in Calcutta.

If I may beg the favour of your procuring, if in your possession, a copy of the same I should feel infinitely indebted—or where it may be obtained.

I remain,

Your obedient servant,

W. FENNER,

Comdg. E. I. C. Steamer Conqueror, Indus Flotilla.

E. I. C. Steam Vessel Conqueror,

Sukkur, November 4th, 1845.

The Secretary stated that neither himself nor the Sub-Secretary had been able to procure the work alluded to.*

Read the following papers:—

Extract of a letter from Lieut. Blagrave, B. I., to the Sub-Secretary, dated Kurrachee, 16th October, 1845.

"Accept my best thanks for the papers on Scinde, and for the trouble you took in getting the works on Conchology for me. We are getting up an Association here to collect information, &c. &c. about the country; I enclose an account of the first meeting. By and bye I hope we may be able to publish papers, but at present we are only to make collections of books, coins, fossils, &c. Can you tell me whether the whole of the Journal of the Asiatic Society is procurable in Calcutta? we want to get it, and as many other works containing notices relative to Scinde as possible."

SCINDE ASSOCIATION.

At a meeting held in the house of Captain Preedy, on the 9th October, the following gentlemen were present:—

His Excellency Sir Charles Napier, in the chair.

Colonel Douglas.

Captain Preedy.

Captain J. Napier.

Captain W. Napier.

Captain Browne,

Captain Byng.

Doctor Gibbon.

Lieutenant Masters.

Lieutenant Blagrave.

Lieutenant Mayor.

John Macleod, Esq.

Ensign Burton.

and a series of resolutions forming the bodies of the future Rules of the Association were passed.

1st. That an Association be formed at Kurrachee, for the purpose of collecting information concerning the Natural History, Antiquities, Statistics, Dialects, &c., of Sindh, and the adjacent countries; and that it be denominated the Sindh Association.

2nd. That the Sindh Association shall consist of Members, and that any individual of whatever rank or service desirous of joining the Association, shall intimate the same to the Secretary.

3rd. That His Excellency Sir Charles Napier be requested to become the Patron of the Association.

* A copy has been since obtained.

4th. That Colonel Douglas be requested to become the President of the Association.
 5th. That the five following gentlemen be requested to form the Committee at Kur-rachee.

Captain Preedy.

Captain J. Napier.

Captain Browne.

Lieutenant Blagrave.

John Macleod, Esquire.

Ensign Burton, *Acting Secretary and Treasurer.*

6th. That for the general purposes of the Sindh Association,—viz. purchasing books and coins, sending out proper persons to collect specimens of Natural History, &c., &c., a monthly subscription of five Rupees, to be reduced next meeting to two Rupees or one, be paid by each Member, in addition to a donation of twenty Rupees on entrance.

7th. Captain Preedy having kindly offered to place at the disposal of the Association one of the rooms in the new School-room built by him in the neighbourhood of the Town, it is proposed that his offer be accepted as a temporary measure, but that means be taken for raising Funds to erect a building to be devoted solely to the purposes of the Association.

8th. That with respect to the Library, the books to be purchased shall consist of works relating to Sindh, and the adjacent countries, especially to History and Antiquities, also that Scientific works and books of reference be provided for the use of the Members.

9th. That every member be requested to favour the Secretary with any information upon the proposed objects of the Society. Any donations of books, specimens, &c., &c., will be most thankfully received.

10th. That the expence of transmitting all communications be defrayed, if desired, by the Society.

11th. That the Secretary register all papers, and donations, together with the names of the donors, and enter in a book to be kept by him, all miscellaneous and detached memoranda with which he may be favored.

12th. That Quarterly General Meetings be held, and that intermediate meetings also may be called for by the committee, or at the requisition of any five Members.

13th. That the committee now elected be requested to frame, and submit a series of regulations to the next meeting of the Association.

A General Meeting of the Sindh Association will take place on the 8th of November, 1845.

R. BURTON,
Acting Secretary and Treasurer.

At a previous Meeting held at the house of Captain Preedy, on the 9th October, 1845, a series of resolutions, forming the basis of the future rules of the Sindh Association were passed. In conformity with Par. 13.—“ That the Committee now elected be requested to frame and submit a body of By-laws to the next meeting.” At a general meeting of the Association held at the house of Captain Preedy on Saturday the 8th November, 1845. The following By-laws were proposed and passed.

Present.

Colonel Douglas,

Captain Young.

Lieut. Blagrave.

Captain Napier.

Captain Hughes.

Lieut. Maclagan.

Captain Preedy.

Dr. Gibbon.

Lieut. Vanrenen.

1st. This Association, as established mainly for the purpose of collecting a Library of reference, and recording information relative to Sindh,—its Natural History, Antiquities, Statistics, Dialects, &c , shall be denominated the Sindh Association.

2ad. The Association shall consist of Members and Subscribers.

3rd. Any individual, of whatever rank or service, desirous of becoming a member of the Sindh Association, shall intimate the same by letter to the Secretary ; upoa which he shall be proposed at the next moathly meeting of the Committee of Maaagement, and after securing a majority of votes in his favour, shall be duly elected.

4th. All members, resident, or non-resident, shall upon election either pay a Life Composition of Co.'s Rs. 80, or an Entrance Donation of Co.'s Rs. 25, together with a monthly subscription of Co.'s Rs. 2.

5th. Subscribers shall enjoy the same privileges as members, except the rights of voting at General Meetings, being elected members of the Committee of Management, or holding any office whatever in the Association.

6th. Any individual, of whatever rank or service, desirous of subscribing to the Association, shall intimate the same by letter to the Secretary, forwarding the sum of Co.'s Rs. 6—his subscription for the current quarter.

7th. Life Compositions and Entrance Donations shall be paid upon joining the Association, monthly subscriptions shall be paid 3 months in advance by all members and subscribers, resident or non-resident, upon the first days of January, April, July and October.

8th. General Meetings of the Members and Subscribers shall take place Quarterly, upon the second Mondays of January, April, July and October, at which times the Secretary's and Treasurer's accounts shall be audited, lists of purchases presented by the Committee of Management inspected, the committee and office-bearers elected or renewed, and alterations and emendations of the present By-laws of the Association put to the vote.

9th. The office-bearers of the Association shall consist of a President, a Vice-President, a Secretary and a Treasurer.

10th. The President shall preside at the Quarterly General Meetings, conduct the proceedings, and give effect to the resolutions.

11th. The Vice-President of the Association shall preside at and record the proceedings of the monthly meetings of the Committee of Management, conduct the correspondence of the Association, suggest plans for attaining its objects, and in general aid the Secretary in promoting the purposes of the Association.

12th. The Secretary who shall be, ex-officio, member of the Committee of Management, shall superintend all persons employed by the committee to collect such books, coins, and specimens of Natural History as may be required by the Association, and shall lay a detailed list of the same before the Quarterly General Meetings.

He shall register in a book to be kept by him for that purpose, all papers and donations with which he may be favored, superintend the correspondence, and prepare such notes and memoranda as he may judge fit to be submitted to the quarterly general meetings, previous to publication. He shall also assist the Treasurer in preparing quarterly reports of the progress of the Association.

13th. The Treasurer shall superintend every thing connected with the receipts and expenditure of the Association, directed by the committee of management, and submit to

every quarterly general meeting a report and summary of all subsciptions and donations received by him through the Seeretary, together with the payments made out of the funds of the Association.

14th. The Committee of management shall consist of at least five resident members of the Association elected and renewed annually upon the first Monday of every January. The Committee, of which any three members shall be a quorum, shall meet upon the first Monday of every month, at which meetings members shall be elected, and notes and memoranda intended for publication, be inspected previous to laying them before the Quarterly General Meetings of the Association.

15th. Any three office-bearers or members of the Association desirous of assembling the Committee of management within the stated regular periods, shall intimate the same by letter forwarding their reasons to the Seeretary, and the Committee shall be duly warned by the latter to meet upon the day proposed.

16th. Any member or subscriber, desirous of withdrawing his name from the Association, shall declare the same to the Seeretary, at some time before the first days of January, April, July and October. All subsciptions paid in advance, shall be forfeited upon withdrawing from the Association.

17th. The expense of transmitting all communications and donations of books, coins, and specimens of Natural History, shall, if it be desired, be defrayed by the Association.

Subjoined is the amended list of the office-bearers previously elected by the members of the Sindh Assoeiation at the General Meeting held upon the 9th October, 1845.

Patron—H. E. Sir C. Napier.

President—Colonel Douglas.

Vice-President—Captain Preedy.

Committee of Management for the year 1845.

Captain McMurdo.

Captain J. Napier.

Captain Browne.

Captain Hughes.

Doctor Gibbon.

Lieutenant Blagrave.

J. Macleod, Esq.

Mr. Sparks.

Ensign Burton.

Honorary Secretary—Lieutenant Maelagan.

Treasurer—J. Macleod, Esq.

The Donations or Life Compositions and Subsciptions for the current quarter (Rs. 6) are requested to be paid to the Treasurer.

(Signed) R. BURTON,

Camp Kurrachee, 10th October, 1845.

Acting Secretary.

Memorandum by the Sub-Secretary, Asiatic Society.

In submitting the accompanying notice of the Seinde Association, together with an extract from a letter to him from Lieut. Blagrave, a zealous contributor, the Sub-Secretary begs to suggest for the consideration of the Seeretary and Committee of Papers:

1. That the Asiatic Society may be able to give great aid and encouragement to its fellow-labourers in this new and promising field, while it derives also itself no small benefit, and that this may be accomplished at a perfectly trifling expense.

2. He proposes then that the Asiatic Society offer to the Seinde Association to print any contributions which the Editors of the Journal und the Committee may approve of.

as if such were part of its own contributors' labours, reserving always the full right of selection, time, preference, &c.

3. And that it will forward to the Scinde Association copies of every paper so published in the Journal, keeping up for them a regular series of paging in their over-copies, so as to give them a regularly paged series or volume which they may afterwards entitle and index as they please.

4. As there is no press in Scinde, and printing and lithographing are far more expensive at Bombay than here, it is probable that for a long time the Scinde Association may be much checked in its useful labours by this difficulty; for few will write without the hope of publication, and the Asiatic Society can grant this aid with positive benefit to itself. While also, it should be noted, the Scinde Association will perfectly preserve its own independence,* and obtain for all its working members their due share of credit and encouragement.

II. PIDDINGTON.

Museum, 11th Nov. 1845.

Sub-secretary, Asiatic Society.

NOTE.—The Secretary begs strongly to support this proposal which is in his opinion a very happy one, and highly expedient. He also begs permission to forward the back copies of the Journal from the 1st January 1845, and to continue its Transmission gratis to the Scinde Association.

II. TOARENS,

V. P. and Secretary, Asiatic Society.

The Sub-Secretary further begged to propose that the Journal, as far back as in the possession of the Society, be presented to the Scindian Association.

These proposals as recommended by the Secretary and approved by the Committee of Papers, was carried unanimously.

The following letter was addressed to the Scinde Association and is inserted here for the sake of connection:—

The Secretary to the Scinde Association.

SIR,—I am desired to express to you the high gratification with which the Asiatic Society of Bengal has learned, by a communication from Lieutenant Blagrave to its Sub-Secretary, the establishment of the Scinde Association, and its desire to co-operate in every way with the labours of the gentlemen composing it who have before them so interesting a field.

2. And, as the best proof of this desire, I am directed to inform you that the Society at its meeting of the 3rd instant have unanimously adopted the proposal annexed, which it trusts will be agreeable, and afford most efficient aid to your efforts, and further that I

* Were we even to reject a paper sent to us, we could have it printed here for the Scinde Association and paged into their series at their expense or that of the author.

am instructed to forward to you a set of the Journal of the Asiatic Society, as far as available from our stock by such route as you shall direct.

With our best wishes for the prosperity of the Seinde Association,

I am, Sir,

Your obedient servant,

H. TORRENS,

Museum, 5th Dec. 1845.

V. P. and Secretary Asiatic Society.

Read the following letter from Lieutenant Baird Smith to the Sub-Secretary :—

H. PIDDINGTON, Esq.

MY DEAR PIDDINGTON,—I send you herewith another disquisition on earthquakes, being the register for 1843, somewhat in arrears, but this cannot now be avoided, my spare time being so limited. 1844 was so quiet that there are not above four or five shocks to record, so I will combine it with 1845 and send both at once. Part IV. of the Review, which completes it, I must try and send you soon, it will be but a short one, and if I could only get a clear week's work at it, I would soon get clear of it.

I have found nothing at old Kerlsea worthy of the notice of the Society, old iron knives much worn, with stones, and fragments of pottery, pieces of silver bangles, with other indications of the spot having been the site of an old town or village have been met with, but among them none worthy of preservation or transmission to Caleutta.

Your's, &c.

Camp Sahabidpoor, Doab Canal, 10th Nov. 1845.

BAIRD SMITH.

The Secretary stated that the paper had been sent to press, and would appear in No. 164 of the Journal now forthcoming.

Read a letter from Dr. Campbell, Resident, Darjeeling, as follows :—

H. PIDDINGTON, Esq.

MY DEAR MR. PIDDINGTON,—I have the pleasure to send you copy of a letter addressed by me a long time ago to the Secretary of the Society, but which has unfortunately been mislaid. The document which accompanied my letter, and which is alluded to in it, was one of much interest I think, but I did not, I regret to say, keep any copy of it.

Will you do me the favor to inform the Secretary that the tablet forwarded by him for the monument of the late Csoma Korosi, safely reached me at Darjeeling, and was put in its place.*

Your's truly,

A. CAMPBELL, M. D.

Read the following letters :—

To the Secretary of the Asiatic Society of Bengal.

SIR,—Enclosed we have the pleasure to wait upon you with Bill of Lading for 4 cases and 1 stuffed snake, shipped to your address per *Fire Queen*. These, together with the enclosed letter, were delivered to us by Captain Vander Brooke, of H. N. M. Steamer "*Brome*" on the 5th instant, with a request to have the same forwarded to their destination. As we have no further instructions regarding them, and know nothing of the

* See Proceedings, February, 1845.

intrinsic value of the contents of the cases, (which we believe contain specimens of Natural History,) we do not effect insurance. Such being the nature of the packages, we wave with much pleasure the charges incurred in forwarding the same, as we understand they come from the Asiatic Society of Java.

Your's, &c.,

Singapore, 24th Oct. 1845.

A. L. JOHNSTON AND CO.

A Monsieur le Vice Président et Secrétaire de la Société Asiatique de Bengal.

MONSIEUR!—C'est avec un vif plaisir, que la Société des Arts et des Sciences de Batavia a reçu la lettre du 3 Juin, 1845, dont vous avez bien voulu m'honorer, et l'envoi des volumes des Transactions et du Journal mensuel de votre honorable Société.

En me pressant de vous témoigner la parfaite satisfaction de notre Société sur ce qu'elle vient de recevoir, j'espere de même satisfaire au desir, exprimé dans la susdite lettre et dans la note de Mr. Blyth qui l'accompagnait, en vous offrant tout ce dont jé puis disposer pour votre Musée.

J'espere qu'il vous sera agréable de recevoir tous les arrière-volumes, disponibles, de Transactions de notre Société, dont notre membre correspondant Mr. Melvill de Carnbée ne vous a pas encore fait l'offerte. Vous trouverez ci joint les volumes I. V. VII. VIII. XI. XII. XV. XVI. XVII. et XX. Prochainement nous auroys l'honneur de vous faire parvenir le volume XXI. dont la publication se trouve un peu retardée.

Les livres classiques de littérature Orientale, que votre Société a publiée, seront de beaucoup de prix auprès de nous, surtout parce que nous nous occupons maintenant principalement avec la littérature Javanaise et qu'il y a beaucoup de rapports entre celle ci et la littérature ancienne du continent de l'Inde.

Un exemplaire du catalogue de notre collection Archéologique, qui en ce moment est sous presse, vous sera transmis, incessamment après que ce travail sera achevé.

J'ai l'honneur de vous offrir ci joint un exemplaire d'un journal, que je publie depuis sept ans, et qui est voué à l'ethnographie, l'archéologie, la littérature, etc. de l'Archipel Indien.

Nous le regrettons infiniment, de n'être plus dans l'occasion de vous faire des envois considérables pour votre Musée d'histoire naturelle. Depuis 1843 plusieurs causes ont contribués à la suppression de notre Musée Zoologique. Tous les échantillons remarquables ont été offerts au Musée Royal d'histoire naturelle de Leide, et tous les autres, y compris ceux d'une mauvaise conservation, ont été vendus. Cette suppression nous la regrettons d'autant plus, qu'elle nous empêche de vous faire l'offerte des Mammifères et des oiseaux de l'Archipel Indien, qui, nécessairement d'une haute importance pour vos galeries Zoologiques, ne sont que d'un intérêt subordonné pour le Musée royal de Leide, qui possédait déjà des échantillons de toutes les espèces, avant notre dernier envoi. Ce qu'il nous reste encore, quoique peutêtre de très peu d'importance pour vos galeries, nous vous l'envoyons, comme témoignage de nos vœux sincères, autant d'être utile à votre Institution, que de profiter nous même, pour la notre.

Dans une des caisses ci jointes vous trouverez quelques espèces de Cheiroptères de l'ile de Java et plusieurs espèces d'oiseaux de l'Archipel Indien. Les Cheiroptères appartiennent, comme vous pourrez voir, aux genres Pteropus, Rhinolophus, Dysopes, etc. Les oiseaux aux genres Falco, Buceros, Coracias, Sparactes, Muscicapa, Saxicola, Sylvia, Fringilla, Parus, Hirundo, Cypselus, Podargus, Alcedo, Dacelo, Merops, Dicæum, Nectarinia, Pieus, Psittaenus, Bucco, Tropic, Centropus, Perdix, Co-

lumba, etc. Quoique plusieurs de ces échantillons sont d'une mauvaise conservation, nous ne doutons nullement, qu'ils ne vous soient agréables.

Dans une autre caisse nous avons fait emballer une tête osseuse d'un Rhinoceros de Java, capturé dans les forets du plateau de Bandong.

Une quatrième caisse comprend des échantillons de quelques mammifères, notamment d'un Sténops de Java, de trois spéces de Sciurus, d'un Hylogale, d'un Moschus Java-nicus, d'un Lepus mélanauchen, d'un Manis, etc.

Une cinquième caisse enfin comprendra une tête ossense d'un Crocodilus biporcatus de Java, et puis quelques reptiles Cheloniens de Java.

Ce que nous venous de vous offrir, nous n'ignorons nullement, qu'il ne fait qu'une partie tres mince des désiderata, notés sur la liste de Mr. Blyth ; mais nous osons nous flatter, que bientot MM. les Naturalistes, membres de notre Société, nous mettront à même de vous offrir des envois plus considérables et mieux conservés.

Veuillez, Monsieur, agréer l'expression de la haute considération, avec laquelle j'ai l'honneur d'être.

Votre Serviteur devoué,

VAN HOEVELL.

Président de la Société des Arts et Sciences à Batavia.

Batavia, ce 28 Septembre, 1845.

The Seeretary noted here that no reply had been received from the Batavian Society to his first communication forwarding a list of desiderata in the Geological and Mineralogical departments, which had been sent long before the letter here replied to. (See Proceedings of May last).

The Secretary stated that in reference to the purchase of the Kamoos, one of the Arabic works desired by the Royal Academy at Christiana, he had found that a good copy of Mr. Lumsden's edition of that work could not be procured for less than 150 Co.'s Rs. He had therefore referred to Capt. Bonnevick, R. N. N. for his advice before incurring this high charge, and, all things considered, had thought it best to send for the present the Persian Translation, which could be procured for 30 or 35 Rs., and await the farther orders of the University of Christiana.

Read the following letter from Walter Elliott, Esq., Madras C. S.

H. TORRENS, Esq.

MY DEAR TORRENS,—When I was at Guntur the other day I wrote to you for old Col. McKenzie's plans, &c. of Amarawatty, which Mr. Piddington kindly sent to me. I afterwards made some interesting excavations on the same site, and succeeded in laying open the foundations of the magnificent debgope which McKenzie saw in a much more perfect state, but still too imperfect to enable him to understand its plan or shape. In digging out one of the gateways, I came upon some overthrown figures of men and animals, statues, that had ornamented parts of the entrance, and which I found represented in relief on some of the sculptured ornaments of the building which I also dug

out. Guided by this clue I made a plan of the whole, which I have filled up with such details as the sculptures afforded. I think however I should be able to do this much more completely if I had McKenzic's drawings to refer to, and I want you now to try and get me the loan of the Vol. of drawings in the Asiatic Society's Library containing McKenzic's sketches of Amarawatty. I should be able to do all I want in the interval between two steamers, so that if you would send it by one it should be returned by the next.

The style of architecture in this building is totally different from anything Indian I have ever seen, and is probably that of the early Buddhists. All the subjects relate to Buddhist mythology, and the characters of the inscriptions are those of the 3d century, B. C. But the inscriptions themselves are short and otherwise unimportant. So few monuments of that age are extant, and the style of this one is so peculiar, that I think it is highly important to investigate the subject fully. The remains on the spot are now destroyed, the inhabitants removing every bit of marble that appears to burn it into lime, and no one will have the same opportunities that I had to form a guess at the form of the original construction.

I wish you would get me elected a member of your Society. I never get the Journal regularly through my Bookseller, and if I was a member the publisher would forward it to me direct I suppose.

I have got three boat-loads of the sculptures, excavated by me coming down by sea from Masulipatam, which I mean to deposit in the Museum here, but as there will be more than can easily be stowed away I would send you a few specimens if you like it.

Your's, &c.

Madras, Nov. 3 1845.

WALTER ELLIOT.

The Secretary stated that he had, on his own responsibility, forwarded the volume desired to Mr. Elliot.

Read the following letter from Dewan Neel Ruttnu Haldar, of the Board of Customs, Salt and Opium:—

HONORED SIR,—To-morrow being the first Wednesday of the month, I beg to submit a fair copy of the *Kodanda Mandan*, the treatise on Archery, of which I took the liberty of shewing you the original. If the Asiatic Society should like to give this work room in their valuable Library I shall be most happy to make them a present of it.

Your's, &c.

NEEL RUTTON HALDAR.

The Secretary presented on the part of Mr. K. the following coins and Danish Antiquities for the Museum:—

Coins and antiquities presented by the Royal Society of Northern Antiquaries, through Mr. Kamphovener, 3rd December, 1845.

1. A silver coin of Ahmed ben Ismail, (A. D. 907—913). Samarcand.
2. A D. D. of Naso ben Ahmed, (A. D. 913—943). Samarcand, 302, (A. H.) Both coins were found in Denmark!
3. A Set of the coins of Christian 8th, four silver and eight copper coins.
4. Three Danish copper coins from Tranquebar.

5. Four Swedish copper coins. Carl Johann, XIV.
6. A copper coin from Madeira. Maria II. D. G. Port. et Alg. Regina, 1842.
7. A Scandinavian spiral brass armlet.
8. A stone axe.
9. A ditto in an unfinished state.
10. Two stone knives.
11. A ditto with handle.
12. Four stone fragments, (chips.)
13. A stone chisel.
14. A brass chisel (called palotaff) Angl. Celt.

REPORT OF THE CURATOR OF THE MUSEUM OF ECONOMIC GEOLOGY AND DEPARTMENTS OF GEOLOGY AND MINERALOGY.

We have received so little this month, and I have been so much occupied with laboratory pursuits that my report will be very brief.

Geology and Mineralogy.

Messrs. Weaver have sent us three large specimens of fossil wood, but as yet without note of their locality.

Museum of Economic Geology.

We have received the following letter from Government, with the map to which it relates.

No. 985.

FROM THE UNDER-SECRETARY TO THE GOVERNMENT OF BENGAL, TO THE VICE-PRESIDENT AND SECRETARY, ASIATIC SOCIETY.

REVENUE.

SIR,—I am directed to forward, for the use of the Museum of Economic Geology, the accompanying Map of the Central Division of Cuttack, in fifteen parts.

A. TURNBULL,
Under-Secretary to the Government of Bengal.

Dated, Fort William, 26th Nov., 1845.

As also the following announcing that the Coal and Iron Committee being dissolved, the collections, office furniture, and records are to be transferred to the Asiatic Society. I have seen Dr. McClelland on the subject, and when the transfer is effected shall be able duly to report on it.

No. 3089.

FROM THE UNDER-SECRETARY TO THE GOVERNMENT OF BENGAL, TO THE SECRETARY TO THE ASIATIC SOCIETY.

STEAM.

SIR,—I am directed to forward, for the information of the Asiatic Society, the annexed Lr. of 10th Nov., 1845, from Secretary copies of correspondence as per margin, with Coal Committee.

Lr. No. 3088, of 29th, do. to do. do.

the late Coal and Iron Committee.
A. TURNBULL,
Under-Secretary to the Government of Bengal.

Dated, Fort William, 29th Nov., 1845.

(COPIES.)

To F. J. HALLIDAY, Esq. SECRETARY TO THE GOVERNMENT OF BENGAL, ETC.

SIR,—I have the honor to state, for the information of His Honor the Deputy Governor, that your letter, No. 2752, dated 22d October, dissolving the Coal Committee, was received on the 27th ultimo. The three following days having been native holidays, it was not circulated until the 1st instant, from which date the Hurkaru and Painter entertained on the Establishment of the Committee have been discharged, but the services of the writer may be necessary for a few weeks longer.

2. I beg herewith to annex a list of office furniture and collections, for the disposal of which I solicit the orders of Government, as well as of the Committee record.

I have, &c.

(Signed) J. McCLELLAND,
Late Secretary Coal and Iron Committee.

Calcutta, the 10th Nov., 1845.

| | |
|--|-------|
| Mural tables containing Geological collections, | No. 3 |
| Almirah,..... | „ 1 |
| Collections of specimens of coal and iron ores from various parts, | „ 3 |
| Folio-books of records,..... | „ 5 |

(Signed) J. McCLELLAND,
Secretary, late Coal Committee.

No. 3088.

FROM THE UNDER-SECRETARY TO THE GOVERNMENT OF BENGAL TO THE SECRETARY TO THE LATE COAL COMMITTEE.

STEAM.

SIR,—In reply to your letter of the 10th instant, I am directed to request that you will forward to the Secretary to the Asiatic Society, the collections, records, &c. of the late Coal Committee, for deposit in the Society's rooms.

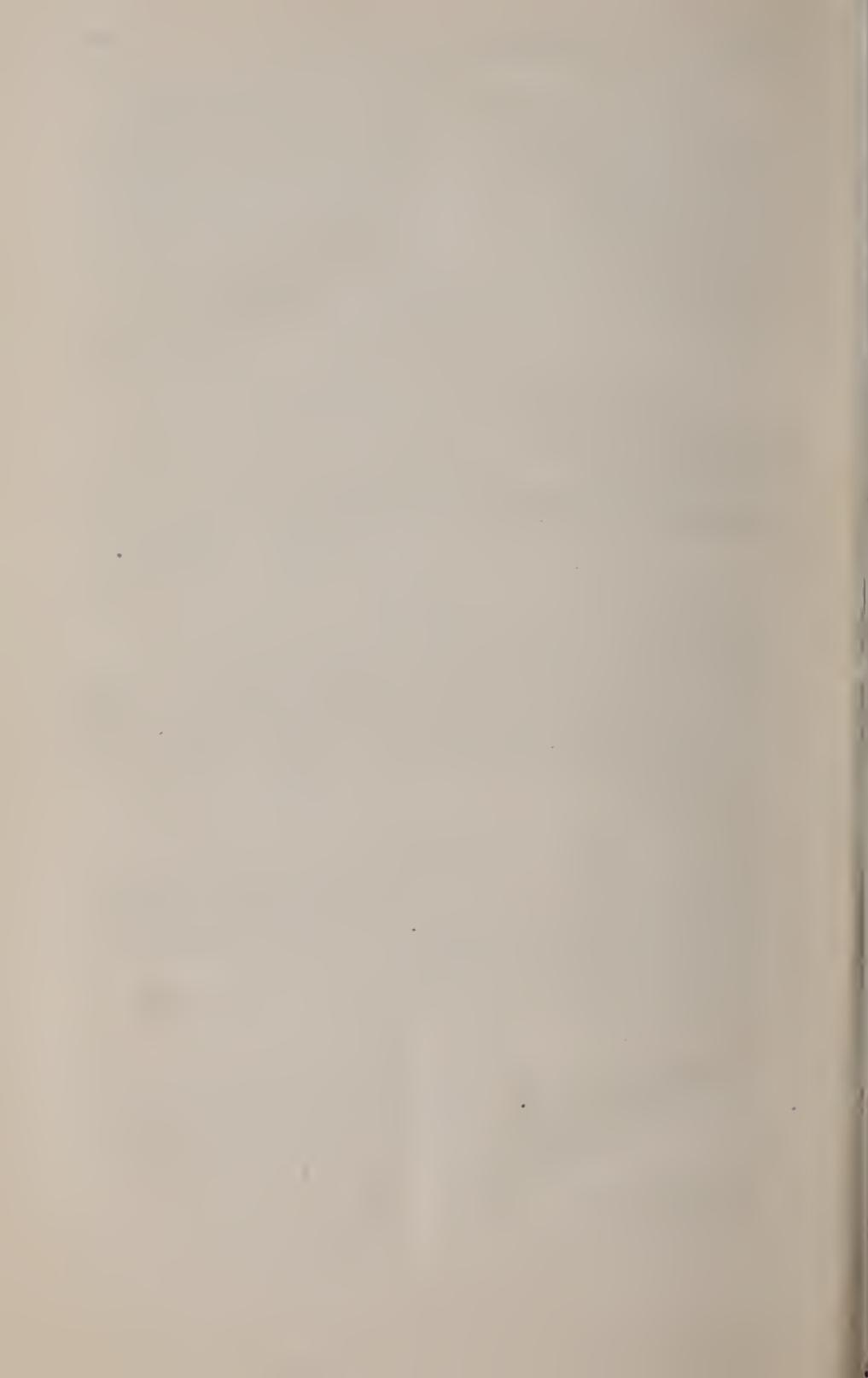
(Signed) A. TURNBULL,
Under-Secretary to the Government of Bengal.

Dated, Fort William, 29th Nov., 1845.

(True Copies.)

A. TURNBULL,
Under-Secretary to the Government of Bengal.

For all the foregoing presentations and communications the best thanks of the Society were accorded.



एसियाटिक् सोसाइट् संस्कृत नागराक्षर ॥

| | | | | |
|------------------------------------|-----|-----|-----|-----|
| महाभारतं आद्यन्त ४ खण्ड | ... | ... | ... | ४० |
| महाभारतोयान्वर्गतसूचीपत्रं आद्यन्त | | | | |
| ४ खण्ड | ... | ... | ... | ६ |
| नैषध आद्यन्त सटोक् १ खण्ड | ... | ... | ... | ६ |
| हरिवंश आद्यन्त १ खण्ड | ... | ... | ... | ५ |
| राजतरङ्गिणी आद्यन्त १ खण्ड | ... | ... | ... | ५ |
| सुश्रुत आद्यन्त २ खण्ड | ... | ... | ... | ८ |
| सूची पुस्तकं १ खण्ड | ... | ... | ... | १ |
| लासनेन रचितं सर्व साधारण | ... | ... | ... | ४ |
| गीतगीविन्द १ खण्ड | ... | ... | ... | २॥ |
| यज्ञदत्तवधः १ खण्ड | ... | ... | ... | २२॥ |
| शकुन्तला नाटक् | ... | ... | ... | १० |

فهرست کتابهای عربی و فارسی مطبوع که در خانه اشیاتک سوسیتی حسب تفصیل الذیل بقیمتهای مناسب برای فروخت موجود اند

| اسامي کتب | قيمت |
|---|------------|
| فتاوی عالمگیری مرتب بشش جلد في جلد هشت روپیه | |
| عنایه جلد ثانی وثالث ورابع في جلد ... هشت روپیه | |
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| جوامع علم ریاضی | چهار روپیه |
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